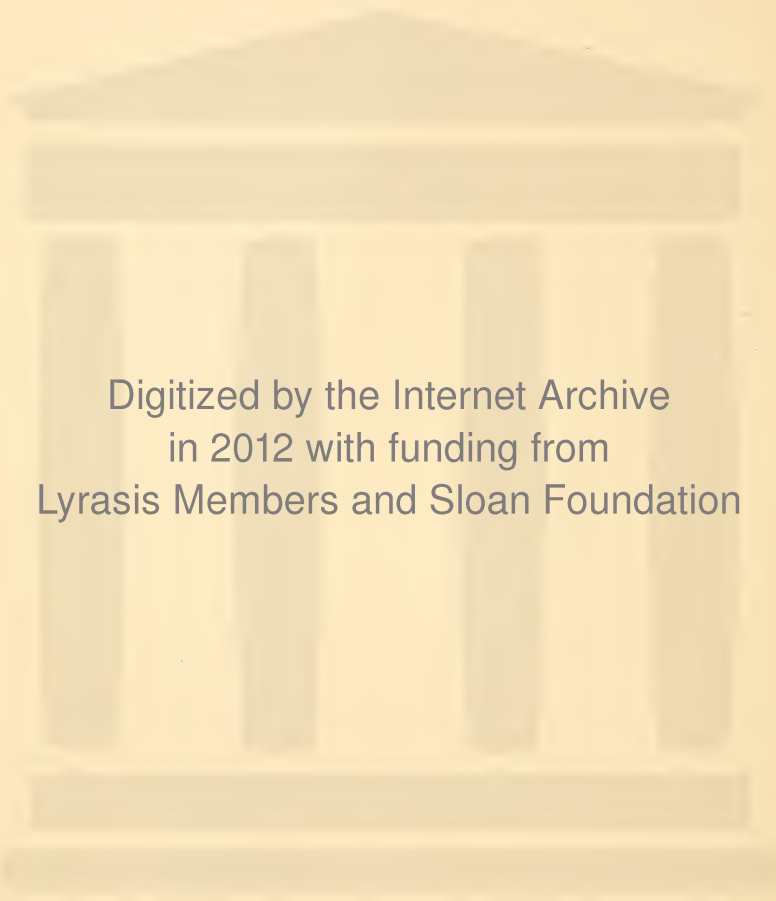




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THE LAME, THE HALT, AND THE BLIND





BITTER MEDICINE

From a painting by Adriaen Brouwer, 17th century

THE LAME, THE HALT, AND THE BLIND

*The Vital Rôle of Medicine
in the History of
Civilization*

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WITH 200 ILLUSTRATIONS FROM
ORIGINAL SOURCES



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THIS BOOK IS DEDICATED TO
JOSEPHINE F. HAGGARD

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Part One

MEDICINE'S PLACE IN HISTORY

CHAPTER ONE

"AND FINALLY THE PHYSICIAN"



RECENTLY read a rather large volume devoted to a general and popular survey of man's history. It was intended, so the author said, to give the general reader a well-balanced presentation of all of the forces that have been instrumental in shaping our civilization. In reality it dealt extensively with war, politics, religion, literature, art, and economics. But in this entire book there was only one mention of medicine. The author said in one place that the ancient Athenian cities were limited in size because no adequate system of sanitation had then been developed. In that one sentence he raised the influence of medicine upon civilization to a level with and higher even than that of war and religion. But having made that one statement, he returned again to the customary story of the triumph of rulers, the machination of priests, and the intrigue of mistresses. If the historians do not record the influence of medicine upon civilization, how may we expect the man of the street to appreciate medical science, to know it from quackery, or to realize what a tremendous force it is in giving us the best in modern civilization?

Few people outside of the medical profession have an inkling of the vastly important part that medicine has played in shaping civilization; and many physicians even fail to appreciate as fully as they might the great and fundamental cultural aspects of their profession. Now and then a historian in the field of general history seems to recognize very vaguely that modern civilization perhaps owes a debt to medical science, and some few, and they are certainly the exceptions, pay a passing tribute to medical science. But I fear it is generally a lip service, exaggerated in the intention of pleasing

the assembled members of a medical convention. The one such that comes to my mind particularly is the statement once made, probably with all sincerity, by President A. Lawrence Lowell of



A STREET SCENE AT NIGHT IN THE FIFTEENTH CENTURY

From the works of Sebastian Brant, 1498. Nightgowns had not come into use at that period.

Harvard in summarizing the progress of civilization. He said: "It is hardly an exaggeration to summarize the history of four hundred years by saying that the leading idea of a conquering nation in relation to the conquered was in 1600 to change their religion; in

1700 to change their laws; in 1800 to change their trade; and 1900 to change their drainage. May we not say that on the prow of the conquering ship in these four hundred years, first stood the priest, then the lawyer, then the merchant, and finally the physician?"

A very pleasing tribute indeed to the medical profession, but if it be true that there stands today the physician on the prow of the ship of civilization, then why do not historians, all modern historians, in their written pages give medical science the pre-eminence which it deserves? Why do they not come forward frankly with the full truth, that modern civilization is based upon modern medical science and made possible by modern medical science? But to most historians the story of medicine is a closed book, and that in spite of the fact that medicine today is almost the religion of man's salvation on earth, the most practical and the most humane philosophy that has ever been evolved.

To make more concrete my point that medicine is one of the basic forces molding civilization, let me cite an instance or two showing some of the fundamental aspects wherein medicine bears upon civilization—not the men of medicine, not their deeds, but the influence of medical matters in shaping man's history.

Let us take first an achievement that brings us into modern times, that concerning the yellow-fever situation that formerly existed in the West Indies and along the neighboring coast. Now that disease may have been in these localities from time immemorial, or it may have been brought there by the slave trade.¹ That is a question upon which opinion is divided. Moreover, the problems of how diseases arise, how an organism becomes parasitic on one or more hosts, and how tolerance and immunity are developed involve evolutionary questions aside from our consideration here. The facts remain that years ago in a limited area of the world the yellow-fever organism had become parasitic upon man and a mosquito, and that, moreover, in these localities there had developed a biological balance between three parties concerned—the parasite and its two hosts.

Yellow fever is very fatal to adults, but it is a comparatively

¹ For an excellent discussion of the origin of yellow fever see *Yellow Fever*, by H. R. Carter, 1931. This author is strongly in favor of the African origin.

mild disease for children—rarely fatal among them. Among the natives in these areas where yellow fever was endemic it was a universal disease, acquired in childhood, less fatal perhaps than

IN A NUT SHELL
 WE ALL KNOW THE DANGER OF
YELLOW FEVER
 but we become EARNEST ONLY
 after it claims our own blood.
INFECTION BY MOSQUITOES
 IS NO LONGER A THEORY
 BUT A PROVEN FACT
GET RID OF THE MOSQUITTO
 BY BURNING
SULPHUR FOR FUMIGATION
 UNDER THE DIRECTION OF THE
MARINE HOSPITAL SERVICE
 START IN ON
SUNDAY AT 10 A. M.
 AND KEEP AT IT UNTIL NOON
 OR LATER

YELLOW FEVER IN NEW ORLEANS

A poster used in 1905 during an outbreak of yellow fever at New Orleans. Quarantine regulations against yellow fever were established in Philadelphia in 1856; other seaboard cities followed the example at various times. There was no uniform system of regulation until 1895, when Congress passed an Act establishing a national quarantine system and vested the necessary power in the Marine Hospital Service, which was created in 1798 primarily to care for merchant seamen. Various additional duties have been vested in the organization, until now it has expanded into the United States Public Health Service. The Yellow Fever Commission, headed by Major Walter Reed, U. S. M. C., demonstrated in 1901 that yellow fever is transmitted by the mosquito; on the basis of this knowledge the Marine Hospital Service was able to check promptly the epidemic in New Orleans.

measles among us; one attack gave protection for life. In the areas where yellow fever was endemic it flourished luxuriantly, but with no great hardship to the natives or to the mosquitoes. All three

factors were in nice adjustment, no doubt to the entire satisfaction of the yellow-fever parasite. Thus it was, as I say, a well-established biological balance.

Things would have no doubt gone along in this manner indefinitely, except for the fact that the Spaniards, the Dutch, the Portuguese, and the English came to the regions where yellow fever existed. These new arrivals were adults, and they were not protected against the disease by childhood attacks. The biological balance was upset. For these adults yellow fever was not a mild disease; among them the mortality was forty, fifty, and sixty per cent. The soldier, the colonist, the buccaneer, and the trader were harried by a disease toward which the natives were indifferent. The mortality among the British troops in Bermuda and Jamaica until only a few years ago was so great that the successive garrisons were nearly exterminated. An annual mortality of two hundred in a thousand was the ordinary occurrence, and this was on islands which today, by the grace of modern medical science, are health resorts. The natives who lived in the islands traded only over short distances in their canoes; they were not a people given to expeditions or explorations. The mosquitoes, infested with yellow fever, do not fly over long distances, but remain near the huts where they breed. The endemic area of yellow fever was no doubt extended gradually through the centuries; once in a while the disease must have been carried to some new tribe, devastating it until with a new generation tolerance was established and the tribe perhaps reorganized. It may have been this gradual extension of the yellow-fever areas that has left for us the remnants of once great native civilizations unable to reorganize and so wiped out, as perhaps was the Maya civilization. But certainly until the development of commerce the areas of yellow fever were limited and fairly sharply circumscribed. But the new arrivals to the New World islands upset another balance; they introduced commerce. The ships of the Spaniards and barques of the buccaneers widened out the circle of exchange; that the historian would see as a sign of advancing civilization. Ships went to Spain, Portugal, France, and England. And with them went the infested yellow-fever mosquitoes. For brief seasons, that were fortunately terminated by winter weather, the



THE SECTS OF FLAGELLANTS

Dating from the time of the Christian hermits, castigation became popular as a means of religious penance, particularly in the monasteries. Priests flagellated themselves to suppress the longings of the flesh, although this practice sometimes excites rather than diminishes them. Flagellation was frequently prescribed for penitents, in which case the priests administered the chastisement. A flagellation was ordered for Henry IV of France for the expiation of past sins at the time he took the crown, but at that date the practice was dying out and he was whipped by proxy. During the Middle Ages, however, flagellation spread widely among the people, and sects of flagellants were organized for the purpose of systematizing the chastisement. The old wood-cut shown here demonstrates the various weapons employed, ranging from ostrich feathers to chains and nettles. The pillar in the background was probably intended to represent St. Simeon Stylites, who mortified his flesh for many years while perched on a tall pillar, part of the time on one leg.

stab of the mosquitoes spread the deadly disease within the European cities.

The ships of commerce came along the coast of the Atlantic; yellow fever was carried as a seasonable disease as far north as Boston. In 1793 Philadelphia was thrown into a most deplorable state of panic because in the summer of that year ten per cent of its population died of this tropical disease in spite of Benjamin Rush's earnest efforts with his famous ten and ten (ten grains of jallop, ten grains of calomel), with bleeding to unconsciousness.

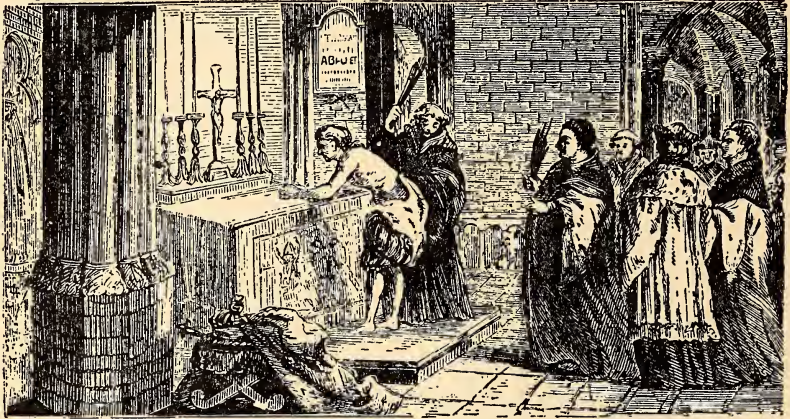
Exploration, commerce—the progress of civilization—had upset a biological balance, and it was not until 1900 that modern medical science came to the support of civilization and removed the scourge of yellow fever.

But before it did, the endemic areas of the disease had been widened to cover a large area of South and Central America—the regions which have been called so graphically the white man's grave.

Except for yellow fever the Panama Canal would belong to France, for, as you know, a company of that country started to work in the Isthmus under the guidance of the famous de Lesseps who built the Suez Canal. They were defeated by disease, and when the Americans undertook the work of making the canal, their way was marked by the deserted equipment of the French, buried in a jungle that had sprung up about the rusted machinery. Of the railroad there, it was said in metaphor, but not a hyperbolic one, that there was the body of a workingman buried under every cross-tie. But the Americans went into the zone armed with a bit of knowledge supplied by modern medical science—the knowledge for which Walter Reed, Jesse Lazear, James Carroll, and Aristides Agramonte sought and found, and for which Jesse Lazear gave his life, the knowledge that told us how yellow fever was transmitted and how to rid the tropics of this disease.

But pause a moment. Suppose that without that knowledge the Canal had been built with immense loss of life; it would lie idle today, the jungle creeping to its edges, its locks deserted, no ships passing through it. For if yellow fever still existed there as it once did, every port in the world would be closed to a ship that passed

through the Canal. Today, how indifferent are the passengers of Canal steamers to the medical triumph that lies before them; they see the engineering triumph, the steel, the concrete, and the stone, but little do they realize that they go in safety through an area across which, thirty years ago, no white man could venture except at a risk of life far greater than that experienced today in a transatlantic airplane flight.



HENRY II SCOURGED AT THE ALTAR OF THOMAS A' BECKET

The Archbishop of Canterbury was assassinated because an expression of the king seemed to indicate a wish for his death—"not one will deliver me from the low-born priests!" The king expressed sorrow, but the church would not grant him absolution until he had been whipped, the only complete penance. The king knelt at the tomb of Becket and received five strokes from each bishop and abbot present, and three from each of the eighty monks.

Yet a man skeptical of the importance of modern medical science might say that yellow fever did not hurt the natives where it was continually present, and so why not let it become universal throughout the world; let nature take its course; let a world-wide biological balance be established; let all babies have it; let all men be immune. Why should medicine rush in to build an artificial support to replace a natural biological balance? The answer to that objection is, of course, that yellow fever can thrive continually only in tropical and semi-tropical regions; there only can the balance be held. A far easier way to control the situation would be to stop all com-

merce and all trade, isolate the endemic zones, set them off from all contact with the rest of the world. But that move our general historian would see in the light only of a marked regression of civili-



HUNTING FOR LICE

A domestic scene from the painting of Van Ostade. During the Middle Ages the common people lived in the most abject squalor; they were vermin-ridden. In the crowded walled cities there were neither sewers nor paved streets; the houses were overrun with flies, fleas, and lice; the floors were strewn with dirty rushes changed at infrequent intervals. The vermin were not limited to the poor, but were probably universal. Pepys, in his *Diary*, comments on his own infection with lice and fleas on several occasions; the mummy of one of the Egyptian Pharaohs shows evidence of nits, the eggs of head lice, which were on the hair at the time of embalming.

zation. The fact remains that modern civilization can advance, can hold what it has already won, only with the continued aid of medical science.

Why, then, do not the histories that our children read in school and our boys and girls study in college give the same detailed consideration to medicine and civilization that they do to war and civilization, politics and civilization, religion and civilization? There are many answers, and here is one of them.

Medical science, on the one hand, and physical and social science, on the other, are vital parts of civilization, but many people take quite different attitudes towards them. Nearly every one realizes more or less distinctly the advantages accruing from the telephone and the automobile, the changing conditions that result from the upheavals of war, the blessings of peace, and the ever-pressing considerations of economics. Comparatively few, however, appreciate the dependency of civilization upon modern medicine. The reason why one is appreciated and the other is not is probably to be found in the fact that the contributions of one are positive; those of the other, negative. The greatest triumph of medical science is the absence of disease. Yet I am sure that if a people possessing, let us say, automobiles, but scourged continually with Asiatic cholera, could take their choice of retaining automobiles or being free from cholera, there can be little doubt that they would pick the latter. But the man of the twentieth century forgets, if he ever knew, that cholera has spread in this country, that yellow fever decimated Philadelphia, that bubonic plague has touched our shores, and that a comparatively few years ago typhoid fever alone killed more men than die today from all the acutely infectious diseases put together. The man of the street is oblivious to the fact that these diseases could return. His appreciation of medical science is to a great extent limited to an ardent desire for the elimination of the diseases which *still* afflict mankind. And the general historian has perhaps no clearer vision in these matters than has the average man outside of the medical profession.

The control of yellow fever—the story of which I have briefly sketched—is not by any means the only instance in which medical science has affected civilization directly; it is only one of the countless examples. General history, world history, is a continual succession of them, if only the historian could recognize them. But what general historian, among his many theories for the decline and

eventual fall of Rome—social, political, economic theories—enumerates also the medical one—the rise and spread of malaria in Italy? Malaria undermined the constitution and morale of the agricultural population quite as much as did slave labor and the dole of grain, and drove the farmers into the cities to fill the slums with a diseased, degenerate, and hence shiftless and useless population.



A GROUP OF LEPERS

Tracing from a fresco at Pisa, "The Triumph of Death," by Orcagna (Andrea di Cione), dating from the fourteenth century. The lepers are shown with various deformities from their disease; one has lost both hands, another has his hand bandaged, and three are afflicted in the lower limbs. Leprosy was spread widely throughout Europe as a result of the Crusades, and found a fertile soil in the conditions of domestic squalor. Subsequently the lepers were isolated in the monasteries of St. Lazarus, and in the course of three or four hundred years the disease largely died out, particularly with improvement in living conditions.

Let us continue for a moment with medicine and civilization into those days following the fall of the empire. Really there was no medicine in Europe worthy of the name, for at the pressure of medieval Christianity medicine reverted to the primitive philosophy of healing—the philosophy so strongly in contrast with that of rational medicine. The philosophy of primitive medicine is based on the belief that disease is caused by supernatural forces. It associates

disease with sin, and attempts to overcome it with ceremonious and superstitious measures or else drive it away with wishful thinking. There is no clearer statement of primitive medicine than that found in the words of one of the disciples when a certain blind man came before Jesus. They were, "Who has sinned, this man or his parents, that he was born blind?"

In complete contrast, the philosophy of rational medicine, so clearly defined by the Greek Hippocrates, 2,300 years ago, is based on the conception that disease arises from natural causes. It associates sickness with ignorance. It is rational medicine that shapes advancing civilization, while primitive medicine makes for regression of civilization. The mental-healing cults in our midst are, of course, survivals of primitive medicine.

Now many historians and many essayists have a flair for the Middle Ages—those days of faith and filth. But such men cannot know the actual medical conditions that existed then, for if they did and still wished for a return of medieval conditions, then I think they need the serious attention of an alienist quite as much as did the nations of Europe in those days of national insanities and national hysterias as exemplified in the crusades to the Holy Lands, the Children's Crusades, the dancing mania, and the epidemics of flagellation.

It was, in fact, the Crusades, started by a financial appeal to an ignorant, neurotic, superstitious, and illiterate population, that formed the roadway through which many diseases came into Europe. When the medieval baron stood alone in his petty might, supreme over his lands and his serfs, repelling all intruders, suspicious of any stranger who wandered through the forest paths, there was, no doubt, relatively little epidemic disease among the people, isolated as they were in small communities with little communication. True, when the damp weather blighted the rye from which the crude black bread was made, there were epidemic outbreaks of ergotism. True also there was always the consumptive, shivering before the meager smoking fire of the sod hovel or waking with his cough the echoes in the desolate, draughty, stone castles with their unglazed windows and filthy, rush-strewn floors. But the travel was so slow, so unorganized, in those days, that few acutely

infectious diseases could be carried over any great distance. A company of travelers could acquire smallpox in the East, but before they had made their tedious way to Europe their dead were buried and their survivors were recovered beyond the stage in which they could transmit the disease. But when the Crusades opened the way to the East, they formed a line of travel marked here and there with hospices for the poor and sick. A living line of communication was stretched along which disease could travel; smallpox spread, and so also did leprosy; diphtheria and perhaps scarlet fever came home with the armies of the Crusaders, and when the troops disbanded, disease was carried to every baronial strong hold and to every medieval city. Bubonic plague, dormant since the days of Justinian, reached its devastating tentacles over the people of Europe, who became disease-ridden and scourged with pestilence. There was a prodigious birth rate, a prodigious mortality, and a stationary or falling population.

Have I implied that there were no rational attempts at control of epidemic diseases? Truthfully, there were some. Philip the Fair of France took up the question of leprosy and made a concrete suggestion for its control. He said, in effect, "Let us collect in one place all of the lepers and burn them, and so often as more appear, let us burn them also, until the disease is eradicated."

Another suggestion—one that was put into effect—was the institution by the Venetian Republic of the quarantine of ships and travelers. The name signifies the forty days' duration derived from Biblical example.

Or if we may go along a little farther in history, out of the Middle Ages and into the Renaissance, we come in the time of Queen Elizabeth to the discovery of that fundamental sanitary adjunct, the water-closet. It was a humble invention of a medically inclined English courtier, a man whose ideas were four centuries before his time, but who, as a practical contributor to human culture, deserves to have his name immortalized along with those of his contemporaries, Shakespeare and Bacon. I refer to Sir John Harington, sometime medical translator, tutor, and sanitarian. It seems appalling to us today to think that such great palaces as that of Versailles and the great buildings like Saint Paul's of London, de-

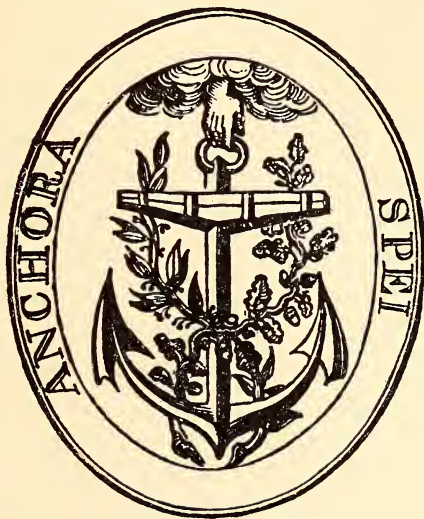


A PENALTY FOR IMPROPRIETY

Title page of Sir John Harington's translation of *Orlando Furioso*. Sir John studied at Eton and at Christ's College, Cambridge. He is said to have translated the story of Giocondo from Ariosto and to have been reproved by Queen Elizabeth for acquainting her ladies with so salacious a selection. He was ordered to retire to his country seat at Bath to complete the translation of the entire works. *Orlando Furioso* in English heroical verse was published in 1591 and reprinted in 1607 and 1634. The title page shown here is from the second reprinting. It is said that during Harington's enforced sojourn at Bath he first conceived the idea which led to his invention of the water-closet.

A
NEW DISCOURSE
OF A
STALE SUBJECT;
CALLED THE
METAMORPHOSIS OF AJAX.

WRITTEN BY MISACMOS,
TO HIS FRIEND AND COUSIN PHILOSTILPNOS.



AT LONDON:
Printed by Richard Field, dwelling in the Blackfriars.

1596.

A SANITARY PUN

Title page of Sir John Harington's *Metamorphosis of Ajax*. This famous book tells of Sir John's invention of the water-closet. The title is a pun on the word "jacks," an old slang expression for privy. The book was printed before Sir John was knighted, and among the Rabelasian tales he made an allusion to Leicester which threw him into temporary disgrace. In 1598 he received a commission to serve in Ireland under Essex, and to Elizabeth's annoyance was knighted on the field.

signed by that famous architect, Christopher Wren, the originator of intravenous injection of drugs, had no sanitary accommodations beyond the latrine.

Perhaps you recall that Queen Elizabeth was, in a way, a partner in the invention of Harington's achievement for sanitation. The story runs that, as a young blade of her court—Harington was her godson—he translated into charming English verse the salacious passages from "Orlando Furioso" and circulated them among the ladies-in-waiting to the Queen, much to the outrage of their modesty, so we are told, although it is a little difficult to believe. In consequence, the Queen banished Sir John to his home in Bath, where he should stay until, in penance, he had translated the whole of the book into acceptable English verse. At Bath, bored with the tedium of provincial life and disgusted with the smell of the privy within his house, Sir John invented the water-closet and published the account of his invention in the first Rabelaisian literature in the English language. His book was called *The Metamorphosis of Ajax*—a pun on the word "jacks," which was the slang term for privy. He had truly made a metamorphosis of "a jacks." His book is one of the milestones in the progress of sanitation, but it was set down prematurely, for it was not until well into the nineteenth century that the towns and cities, at the continual urging of the medical profession, extended sewers and water-mains to the houses. And I may add that it was not until very recent times that this profession has brought home to the public and to city officials the fundamental fact that there should be a clear and sharp distinction between a water-main and a sewer. The report of a Royal Commission of 1850 states that at that date only two towns in England cleaned the filth from alleys of the slums, and that in London three hundred sewers opened into the river above the point where the water supply was drawn.

Medicine has influenced broad and general aspects of world history—even exploration. I always like to think of the discovery of America as a medical achievement. Looked at in that light, Galen, the Roman physician who lived in the second century A.D., was the posthumous discoverer of America and the founder of the British Empire—a rather large contribution for any physician. Galen's ideas

of herb-doctoring dominated European medicine for centuries. The crusades opened up the way for the importation of spices, and these in Europe at that time were used as medicaments rather than condiments. Read the extant reports of the treatment given Charles II at the time of his last illness, and you will see that cloves, cinnamon, aloes, cardimon seed, nutmeg, pepper, and other spices were the therapeutic forte of his medical attendants; or read Paré's comments on the use of powdered mummy and unicorn's horn; or the tales of the sophistication by unscrupulous traders of the valuable crocodile's dung; or recall that the potato, when first introduced, was used as a medicament, and that tobacco was employed to cure disease, and that tea and coffee once held the vogue for controlling acidosis that has now been usurped by the citrus fruits, and you will see why the Europeans of the time of Columbus were anxious to obtain what they called spices.

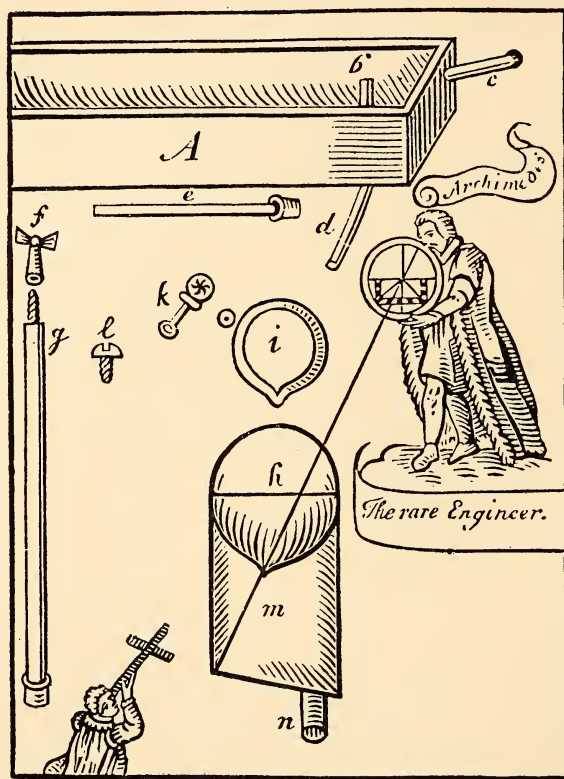
The countries of Europe vied with one another in obtaining these valuable medicinal substances, for they constituted the lightest, most compact, and most valuable cargo that a ship could carry. Columbus sought a short route for the drug trade and quite incidentally discovered America. Then the navies of the world contended for the control of the trade. The naval battles that made bloody the pages of history were fought in the interests of the drug trade—and from them there emerged the British Empire.

These are large and vital affairs, but let us go from them to the other extreme and see how medicine has influenced the lighter and more intimate matters of man's life. For several hundred years, starting with the sixteenth century, wigs were part of the adornment of all men in the fashion. There is every reason to believe that wigs and court plaster owed their vogue to a medical complication—the fifteenth- and sixteenth-century epidemic of syphilis that wrought such havoc with the courtiers. The baldness resulting from this disease necessitated a resort to wigs, and the facial blemishes led to the invention of court plaster—used, as its name implies, first in the courts.

Even when there was no longer the need for wigs, the vogue continued because their advantage had been discovered in the con-

trol of another medical complication—a dermatological one—head lice. So far as one can tell, these parasites were, in bygone days, of almost universal occurrence among rich and poor alike. As you

*This is Don AJAX house of the new fashion, all in sunder;
that a workman may see what he hath to do.*

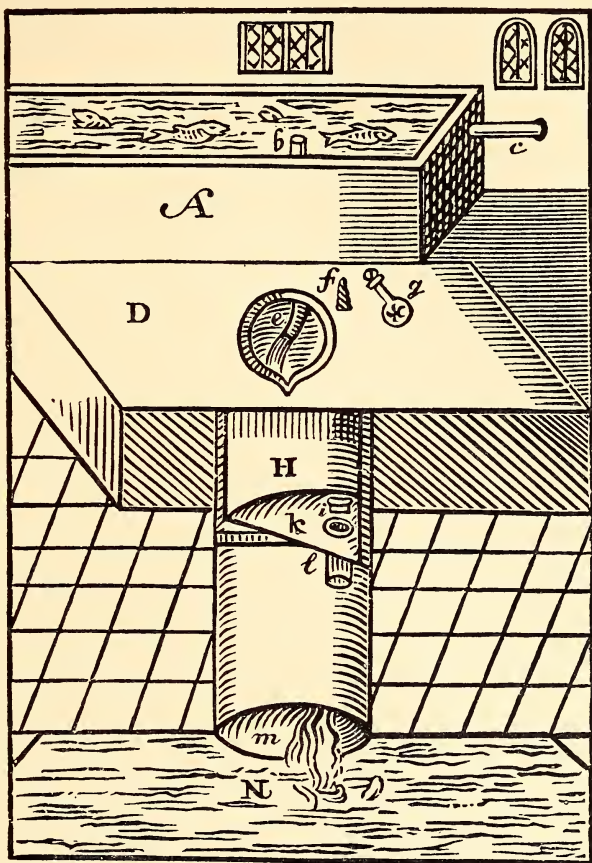


THE ANATOMY OF THE WATER-CLOSET

An illustration for Sir John Harington's *An Anatomie of the Metamorphosed Ajax*. This work, a section of the *Metamorphosis of Ajax*, gives the directions for building a water-closet. The plate shown is the working drawing for the structure.

read Pepys' diary, note the unconcern with which he records the fact that his wife, in looking through his hair, found twenty, both great and small. He was thinking at the moment of buying a wig.

*Here is the same, all put together; that the work-
man may see if it be well.*



A MILESTONE IN THE PROGRESS OF SANITATION

An illustration from Sir John Harington's *An Anatomie of the Metamorphosed Ajax*. The water-closet assembled from the parts shown in the previous plate. Note the fish in the tank, used to indicate the presence of water. Since there were no sewers in England in Elizabethan days, the water-closet was attached to a cesspool. Sir John's invention did not come into general use for some two hundred and fifty years after his time. A stone privy has been found in the palace of Saigon I, 1300 B.C., during excavations at Babylon.

And note also his comment on his bed at an inn, "good but lousy—which did make us merry."

It is really sanitation that is medicine's greatest contribution to general history. Sanitation has made the modern city possible. Picture the medieval walled towns with their mired streets, their homes with open cesspools and hordes of flies and vermin, pigpens on the main thoroughfares, people accustomed to dumping filth out the second-story bedroom windows into the streets, a practice which, we are told, has given rise to the custom still followed by modern swains, when escorting ladies on the street, of giving them the inside position nearer to the house and thus less subject to spatter during the quaint method of sewage disposal. These towns have changed, under the touch of medicine, into the modern city.

About two hundred years ago the industrial revolution started, and with it began extensive urbanization. The people who came from the farms to the cities brought with them the rural ideas of sanitation—rural ideas of those days. And make no mistake, the rural conditions of those times were worse than the horrible conditions that still existed within the towns. The farmhouses were overcrowded, the inmates were underfed, and sanitary provisions were *nil*. The only salvation was a measure of isolation between the farmhouses—a spatial isolation. In the city this isolation did not exist. The incoming rural population flowed into hurriedly constructed tenements. The crowding of the population produced an increase in the spread of disease, but at the same time it brought the deplorable situation clearly into view. A hundred deaths spread over fifty widely separated farms did not make the vivid impression that they did when brought together in a street of closely neighboring tenements. It was easier to apply sanitary measures in a city than in a wide country space—a situation that exists definitely today. So the upshot of the matter was that there was called into effect those measures of public health and public-health legislation which today have made, at least for the poor family, the crowded city a healthier place to live in than the open countryside.

One way to evaluate the benefits conferred on civilization by the advancement of politics, invention, economics, or medicine is

to consider what would happen if the contributions of a particular field were removed from existing civilization. Suppose, for example, that electricity were abolished from New York City. As a result the city would be in darkness, electric trains and elevators stopped, telephones and telegraph useless, the machinery in many factories still, and the streets emptied of automobiles. If no substitute form of power could be found, civilization would go back half a century to the preëlectric days. Instead of New York as it is now it would become again the New York of 1875, with oil-lamps, buildings only a few stories high, and horse cars.

Yet, great as would be the inconvenience involved in the loss of electricity or any other product of physical science, the changes in the conditions of life would be small compared with those which would result from the loss of modern medical science.

Let us consider what would happen to New York or London or any other large city if it were deprived of the protection of medical science. Its civilization would go back five hundred years, if indeed the demoralization and panic at first produced did not destroy the city entirely. The result would not be confined to such inconvenience as would be occasioned by the loss of electricity or steam or any of the products of physical science. It would be a matter of life and death for the greater part of the inhabitants of every city, large and small. The pestilences would return. Epidemics would sweep across the country, and within a decade the greater part of the population would be wiped out. Even those advantages which we owe to the physical sciences and to engineering, instead of assisting in protection, would rather contribute to the spread of disease. Not only would great cities dwindle to a fraction of their present size, but in these disease-ridden towns the people would be sickly and generally short-lived. Large sections of the world which are now prosperous would become uninhabitable. Yellow fever would return to Panama and would block traffic through the canal. Such facilities for travel as the railroad, the steamship, and the airplane would spread disease with far greater rapidity than could the stage-coach or the sailing-ship. If the measures of preventive medicine were lost, if drinking-water were no longer protected or purified, if the sanitary disposal of sewage were not practiced, and

NUGÆ ANTIQUÆ:

BEING A

MISCELLANEOUS COLLECTION

OF

ORIGINAL PAPERS in PROSE and VERSE.

Written in the Reigns of HENRY VIII, EDWARD
VI, MARY, ELIZABETH, JAMES I, &c.

By Sir JOHN HARINGTON,

The Translator of ARIOSTO, and others who lived in
those Times.

With an original PLATE of the
PRINCESS ELIZABETH,

Engraved 1554.

*Non potes in Nugas dicere plura meas,
Ipse ego quam dixi——
—— novimus esse Nihil.*

Martial.

To which is added

An APPENDIX,

CONTAINING

A Specimen of some LETTERS from a GEORGIAN
Merchant at Bath to his Friend in London.

L O N D O N :

Printed for W. FREDERICK, at Bath:

And Sold by J. ROBINSON and ROBERTS, in Paternoster-Row, and J. DODSLEY, in Pall-Mall.

M DCC LXIX.

HARINGTON ESCAPES THE FATE OF ESSEX

Title page for Sir John Harington's *Nugæ Antiquæ*. This collection was first published in 1769; it contains an account of the Irish campaign, which increased Elizabeth's anger against Essex but saved Harington from sharing his fate.

if vaccination were discontinued; every facility for rapid transportation would be equally effective for the rapid spread of disease. Indeed, the population of the country could continue only in sparse and separate communities connected by slow means of transportation—early medieval conditions. Diseases now almost forgotten would return to take their places at the side of the existing pestilences. Leprosy would again spread, for the disease has foci in the United States. Surgery would be the rough wound surgery of the ancients. Aseptic obstetrics would be replaced by the medieval midwife or the barrack hospital with an enormous death rate from puerperal fever. And dentistry would be confined to brutal extractions without anesthetics.

It is not mere imagination, but the cold and literal truth, to say that modern civilization and the use of the inventions and discoveries of physical science would be utterly impossible were it not for medical protection. This protection now ranks in importance scarcely behind that of food supply. When any large section of the country suffers from a flood, or when a city is destroyed by an earthquake or a hurricane, the first cry is for food. But immediately afterwards comes the call for medical assistance and for such sanitary control as will prevent epidemic disease.

That description leaves in the mind perhaps an over-enthusiastic picture of the triumph of medicine, one too strongly couched in the jubilant terms of victory. Attention has been focused on the progress derived largely from one field of medical achievement—that which has grown out of the germ theory. So great have been the advances in that direction that we tend to overlook the fact that there are great fields of medicine in which knowledge has advanced little, if any, over that which Hippocrates could have supplied twenty-three hundred years ago. I need hardly mention the common head cold with its vast literature and little knowledge. Individual medicine—physician to patient—excluding dentistry and surgery, which are, of course, dependent upon an application of the germ theory—has not made the glorious advance that general preventive medicine has under the impetus given to it by bacteriology.

Now I don't mean to say that individual medicine has not made its contributions to the history of the world or shaped the course of

human events. Even in bygone days one can pick out many instances where successions to thrones, the sequence of whole dynasties, have been more strongly influenced by the choice of a physician—good or bad—than they have been by war or politics. There is



A COMMON BATH OF THE FIFTEENTH CENTURY

In some of the great baths at Rome promiscuous nude bathing was permitted; in the provinces separation of the sexes was more usual. Later the Roman bathing practice declined, both because the immorality common under the system brought down condemnation from the Church fathers, who agreed that bathing should be confined to purposes of cleanliness and health and because of the curtailment in water-supply, due to the destruction of the aqueducts. But the habit of the bath as a luxury, and of public buildings for it, continued alive in Europe, for by the twelfth century there are indications that public and promiscuous baths were common, and in the fourteenth and fifteenth centuries they were notorious.

The bathing scene shown here is from a fifteenth-century manuscript. Not only were food and drink served in the bathhouses, but the keeper often carried on a quasi-medical practice as well.

an old French proverb to the effect that a physician saved France by killing Mazarin with his remedies. Another instance is of Catherine de' Medici, ten years barren and no direct successors in the Valois line to the throne, and then her physician whispered some very sound gynecological advice in her ear, and in rapid suc-

cession she presented the world with four of the most degenerate and despicable kings that ever disgraced the throne of France. That was a medical triumph.

My digression here does not affect the fact that there are enormous fields of medical knowledge in which no practical progress



THE BATH AS THE RENDEZVOUS OF GALLANTS

The bathing scene is of the fifteenth century and strongly suggests the immorality for which these institutions were notorious. The abuse of the custom of promiscuous bathing is indicated by the colloquial use of the Italian word *bagnio* (bath) for a brothel.

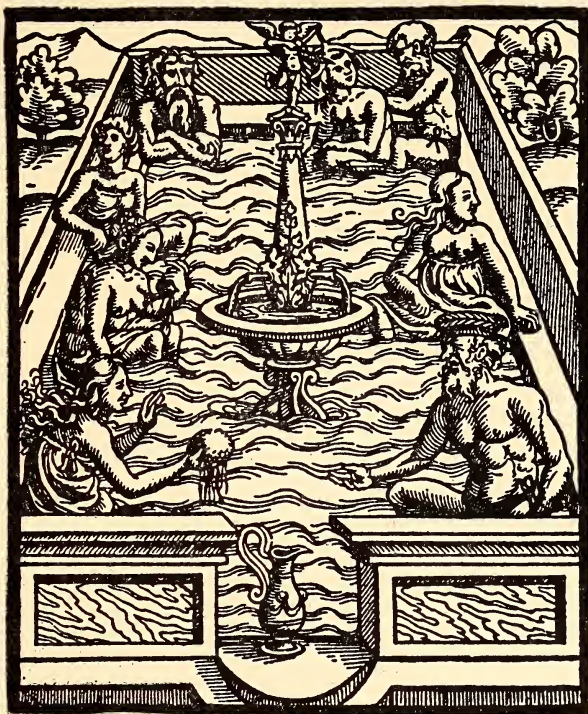
has been made. Faced by that fact there are those who constantly urge increasing activity in medical research. But unfortunately it is not multiplicity of research that leads to discoveries—it is the caliber of the men who carry out the work. There is a vast amount of work being done in the laboratories throughout the world to-day, and there is an enormous mass of literature devoted to matters

scientific. There are altogether more than twenty-five thousand journals given over to scientific publications. The cost of this work is enormous. But there are some who doubt if there is much increase in investigation of the first order.

Furthermore, in the face of this wild scramble for medical discoveries, one great fact is sometimes overlooked. It is this: the discoveries which have already been made are not by any means utilized to their full extent. The vast majority of men and women die of diseases that are preventable or controllable by means now available. The length of life in the higher age groups has not been increased in the last two hundred years, and in the last ten years the expectancy of life after thirty-seven has in this country fallen very appreciably. Most deaths are from diseases that are preventable or controllable. It would appear that there exists a wide discrepancy between what medicine has to offer the patient and what the patient accepts and uses.

Some people accept eagerly all that medicine can give them. It is even true that in many families the physician has taken over the place of the parson and the confessor; true also that the physician is finding his way into the legislature, into the school, and into the court, and that he supervises in the factory. Likewise it is true that men and women in health are more willing today to seek medical advice toward the prevention of disease than at any other time previously. But the fact remains, nevertheless, that such are a comparatively small portion of the total population; most are indifferent. And it is also true that as rational medicine has made its way forward in public confidence and trust, there have advanced side by side with it the healing cults, the health fads and fancies, remnants of primitive medicine but nevertheless accepted by intelligent people and sanctioned by law. How is the layman to know that every religious healing cult of today is merely a survival of savage medicine, and that the laying on of hands with impressive force that we find as part of many of the pseudo medical vagaries (which untrammelled by ethics are blatantly exploited) is likewise a revival of an old practice that has grown up and been discarded like a weed from the medicine of every century; how is he to know that there is no form of quackery or cultism that is not merely a survival of

some ancient and discarded medical foible, revamped, redecorated, and brought up to date for a public that accepts its medical belief not with intelligent discretion, but on faith?



BATHING SCENE OF THE SIXTEENTH CENTURY

The presence here of bathing apparel indicates a somewhat higher moral tone than that in the bathing scenes of the previous pictures, but it was not censure against immorality that brought promiscuous bathing to an end. In the interests of morals, laws were passed segregating the sexes (Nuremberg, 1469), but a more potent force was the advent of leprosy, plague, and syphilis, and the increase of gonorrhea after 1520, which demonstrated that the idea of a common bathing-tank and promiscuous bathing was, at least under the medieval conditions, undesirable, since they were means for the wide spread of these diseases.

It would appear to me that one of the greatest advances that could be made in medicine need not come from the discovery of new cures and new treatments, but only from the wider utilization of the means already available. And what an economy that would be! Not discovery but the dissemination of information is what is

needed most—information that will bring an appreciation of what modern medicine has accomplished and can accomplish if given full trust and full confidence. In part the solution to this problem appears to me to lie in a better knowledge of the history of medicine.

Now so often medical history to the physician is a matter of hero worship. He pays his deep reverence with bowed head to Hippocrates and mumbles a line from the Oath; he nods to Galen; he speaks with hushed voice of that galaxy of medical immortals in which Lister and Koch and Pasteur occupy such eminent positions. Open almost any medical history and you will find it is an encyclopedia of medical notables. But this is not the medical history that interests either the public or the general historian—it is guild history, trade history. What the general historian should know and what he cannot find readily available is the influence of medicine on civilization; the part that medical matters have played in shaping the lives of men and nations. If the general historian does not know the importance of medicine, and hence does not record it, how may we expect the man of the street to appreciate modern medical science?

Medical history is world history. Some phase of medicine has been involved in every great historical event, but usually these medical aspects have been ignored or overlooked. Consequently, when you turn to them they take you away from the beaten path of history and lead you instead into little-known byways of history. Yet, for everyone, medical history is probably more important than any other phase of history, for medical history discloses the forces that have made our modern civilization possible.

In our schools almost every branch of human endeavor is taught from the viewpoint of practical knowledge—save medicine. Politics has its history and its teachings, and so also have economics and trade, but not so medicine—a little optional biology, a little practical hygiene, but nowhere as yet do the boy and girl and the mother and father have brought strikingly before them the fact that modern medical science is today one of the strongest forces operating for human betterment—it is the religion of healthy childhood, manhood, and womanhood.

Part Two

MEDICAL AMATEURS

CHAPTER TWO

MEDICAL LOGIC



HERE is a story which illustrates the commonest error of human reasoning and the one that applies very generally to popular views on medical matters. This error of logic is the basis for quackery, cults, fads, and medical testimonials.

The story has to do with the famous biographer, Plutarch, who wrote *The Lives of Great Greeks and Romans*. His work has survived nearly two thousand years. He was a man of scholarly attainments; he knew Latin and Greek better than any modern student; he had first-hand knowledge of ancient history, literature, and philosophy. He had a classical education, but still he could not reason logically in matters pertaining to health and disease.

Plutarch, in his life of the Roman Emperor Vespasian, tells of the incidents in the capture and execution of Julius Sabinus. Sabinus led a revolt in Gaul and was defeated by the Roman army. He fled and hid with his wife in a cave. For nine years he lived there in constant fear of capture, for throughout this time the Romans sought for him. Finally he was discovered and captured. He and his wife, with the children that had been born to them, were taken to Rome. They were brought before Vespasian. He decreed that Sabinus should die. On hearing this sentence, the wife, with a child at her breast and another at her side, knelt before the emperor. Her plea was not for mercy, but merely to ask that she and her children might suffer the same fate as her husband. Vespasian was not moved to pity by this act of devotion. Instead he granted her request, and accordingly the entire family was executed.

Now Plutarch, in commenting on the incident, makes this statement: "In all the long reign of the emperor there was no deed so

cruel or so piteous to see; and he was afterwards punished for it, for in a short time all of his posterity was extinct."

Such a conclusion as that could never have been drawn by a man who thought logically. It emanates from sentiment and is an opinion based on emotion. It is not logic. Two events occur; first, Vespasian is cruel; and second, his relatives die off. One follows the other. But

New York, July 31, 1841.

PECTORAL HONEY OF LIVERWORT.—Ex-

perience has amply confirmed the utility of this preparation for Coughs, Colds, Spitting of Blood, and all affection of the Lungs, &c.

The unparalleled success with which this justly celebrated medicine has met, has induced some ignorant pretenders to attempt to palm off a counterfeit article on the public; which, in outward appearance so much resembled the original as easily to deceive the unwary. To escape this miserable imposition, remember the GENUINE bears the signature of the proprietor and inventor, JAMES D. NOWILL, in full, on the outside wrapper. The *Counterfeit* is signed J. also, Joseph Nowill, and is made up and sold at the proprietor's former store, corner Madison and Catherine sts.

Remember the genuine IS NOT SOLD at the corner Madison and Catherine sts.

The Genuine may be had of JAMES D. NOWILL, *Sole Proprietor*, at Wm. Watson's Apothecaries' Hall, 36 Catherine-st; Messrs. Olcott, McKesson & Co. 145 Maiden-lane, General Agents for the United States.

Retail of Messrs. Adamson & Oliff, 6 Bowery and 699 Broadway, Rushton & Aspinwall, William st., G. D. Coggeshall, corner Pearl and Rose, W. Watson, 36 Catherine st., J. & I. Coddington, 227 Hudson st., J. Wier, 248½ Grand, C. Cougnacq, 29 Chatham st., J. Milhau Broadway; B. Blagrove and W. P. Blagrove, Brooklyn. au6 1m

HOW TO TELL GENUINE MEDICINE FROM THE COUNTERFEIT

A clipping from the advertising section of the front page of the *New York Tribune*, 1841. Liverwort is of the plant family of the hepaticas; it has no medical value.

simply because one event follows after another is no reason for believing that there is any connection between the two.

The man who thinks logically, who is trained in the principles of science, sees in this situation merely some facts without relation to one another and not enough facts upon which to base a deduction. He says: "This is an uncontrolled experiment. Vespasian's relatives might have died just as quickly even if he had spared Sabinus. As it was, they probably died prosaically of overeating or overdrinking, or else from catching cold sitting on the stone seats at the arena. To establish any relation between Vespasian's act and the death of his relatives we should have to repeat the experiment. That is,

carry out the performance once more, the same in every detail except one—let Vespasian spare Sabinus and see if his posterity lived any longer.”

As the matter stands, the logical man says merely: “Vespasian did so and so. Later his family died out.” He leaves it for the illogical man to supply the interesting but unsound relation between the two occurrences.

It makes little difference now to Sabinus or to you what sort of logic Plutarch used in this case, but there are other matters, par-

TIC-DOLOREUX	TIC DOLOREUX —Positively cured without the use of the lancet, however long standing, by Mrs. MOTT, the celebrated Female Physician. See advertisement. jy27 lmeod*
-ASTHMA-	ASTHMA AND PHTHISIC. —Persons troubled with these distressing diseases, can meet with almost instant relief and speedy cure, by applying to Mrs. MOTT, the celebrated Female Physician. See advertisement. jy27 lmeod*
DROPSY	DROPSY. —Persons laboring under this distressing disease, can be positively cured by Mrs. MOTT, the celebrated Female Physician, without being tapped. jy27 lmeod*
FITS	FITS—FITS. —This dreadful disease is positively cured by Mrs. MOTT, the celebrated Female Physician, No. 119 Spring-street. jy27 lmeod*
SORE-HEADS	SCALD HEADS. —This prevalent disease is speedily eradicated by Mrs. MOTT, Female Physician, No. 119 Spring-street. jy27 lmeod*

A FEMALE PHYSICIAN OFFERS A CURE FOR SORE HEADS

A clipping from the *New York Tribune* of 1841, inserted by the “celebrated Female Physician, Mrs. Mott,” of Spring Street, that city. The term “scald” means here scabby.

ticularly medical matters, which are of vital importance to you now and in which you, as individuals, are called upon to make decisions. The prevalence of quackery and of useless remedies indicates that Plutarch’s mode of fallacious reasoning still persists, for both of these things depend for their existence upon testimonials. Testimonials are always illogical.

Here is a famous instance showing the way in which medical testimonials follow this type of reasoning. This event occurred in the seventeenth century in France, when Louis XIV, the Grand Monarch, was king. At the time with which we are concerned the court

was in disorder and the courtiers distracted, for the young king lay seriously ill. In spite of all the artistry and polished manners of the time, the drinking-water had been neglected and the king's own supply had been grossly contaminated with sewage. In consequence he had typhoid fever. For more than two weeks his fate had been uncertain. All known remedies had been tried; the king had been bled and purged and poulticed, and he had drunk pearls dissolved in vinegar and gold leaf suspended in wine. His physicians were helpless and they were desperate, for they carried a heavy responsibility; their fate would be uncertain if the king died.

These physicians were educated men—at least they were educated according to the standards of the time. They spoke and wrote Latin, they read Greek, they had studied classic literature, they knew mathematics, botany, history, and such astronomy as the time afforded. But they did not know the principles of science—they were not trained to think logically.

Finally, in their desperation these physicians gave the king a dose of antimony. Soon afterwards he became better and then rapidly recovered. At once they attributed his regained health to the powers of antimony.

We have here the same type of argument that Plutarch used. The king took antimony; the king got well; therefore the antimony must have cured him.

Let me tell you why in this particular instance attention was fixed so strongly on the use of antimony. There was at the time considerable controversy as to whether antimony was a remedy for disease or only a poison. The general opinion favored the latter view and the use of antimony in medicine had nearly ceased. The derivation of its name suggested its poisonous nature, for, according to legend, it came about in this way. An alchemist mixed some of the metal with grain and fed the mixture to hogs. They became fat. He drew an illogical conclusion from the two events—eating the antimony and getting fat. He attributed the fat to the antimony. Next he sought to apply his conclusion. Some monks of his acquaintance, in a monastery, had become thin and emaciated from their prolonged religious fasts. He fed them antimony to make them fat. But instead of getting fat they died. In consequence he



ANTIMONY POPULARIZED

Title page from Basil Valentine's *Triumphal Chariot of Antimony*. The author of this work, published in 1604, was Johann Thöld, an alchemist who wrote under the pseudonym of the mythical fifteenth-century monk, Basil Valentine. The book was responsible for the introduction of antimony compounds into medicine and led all practitioners to prescribe this powerfully emetic compound at the start in fever. The vogue died out, but was unfortunately revived for a time when antimony was used in 1657 to treat Louis XIV.

decided that the metal was not good for monks, and so he named it antimonks, or in the French, antimony.

But to return to Louis XIV. He received a small dose of antimony and he recovered from typhoid fever. Hence by all reasoning, except *logical* reasoning, the antimony had cured him. As a result, the use of antimony became popular in the treatment of all sorts of disease and continued so for more than a hundred years. The man with an education in science would not be guilty of this type of reasoning in medical matters. Instead he would be skeptical and his skepticism would lead him to ask two simple questions. First, was it not possible that the king would have recovered without the antimony? And second, was it not possible that the king recovered in spite of the antimony?

He could answer these two questions, and in order to do so he would use the method of "control" experiment. This simple procedure is followed now in all fields of science and is the basis of the experimental method of investigation. Its use is new. The scientist, if it were possible, would carry out some procedure such as this: He would treat two thousand cases of typhoid fever as nearly alike as possible, except that in one thousand of the cases he would administer antimony, and in other thousand he would not. The second group would be his control. A comparison of the number of recoveries in each group would at once demonstrate whether antimony was beneficial, or harmful, or merely useless. In the time of Louis XIV, men had not yet learned to apply this method.

The type of fallacious reasoning which I have been discussing was pointed out by the philosopher Kant as the greatest cause of human error. He defined it in a sentence of five Latin words—*Post hoc; ergo propter hoc*, which, translated, means After it; therefore because of it.

This error is the soul and essence of testimonials. You are confronted with them in all fields of advertising because advertisers know very well that most people make this error in their reasoning. Consequently they dare to submit to us a picture of Mrs. John Doe in her best hat, and underneath, a printed reproduction of a letter in which she says: "I have always felt miserable. I took your medicine,

or used your automobile, or ate your foods, and now I feel better than ever before." *Post hoc; ergo propter hoc* (After it; therefore

EVIDENCES, &c.

EXTRACTS FROM LETTERS TO THE AUTHOR OF THE
METALLIC DISCOVERY.

PIERPONT EDWARDS, Esq. District Attorney
for the State of Connecticut.

DEAR SIR,

New-Haven, October 7, 1796.

I SHOULD have written you last week, had I then been able to ascertain certain facts, the rumor of which I had heard. A Mrs. Beers, a near neighbor to me, the wife of Eber Beers, and daughter of Capt. Samuel Huggins, of this town, had been, for fourteen weeks, exceedingly distressed with the Rheumatism, to such a degree that for the fourteen weeks, previous to the 29th of last month, she had not been able to walk across her room even with crutches, save only once, when she made out with the assistance of crutches, to hobble part of the way across her room.—On the 29th of September last, she procured a set of your Metallic Substances, and in less than an hour after she had begun to use them, in the manner directed by you, she rose from her chair, and walked about her house, and on the next day she went abroad to her neighbors, having thrown aside her crutches. I have this day

THE DISTRICT ATTORNEY FOR THE STATE OF CONNECTICUT GIVES A TESTIMONIAL

From a pamphlet published by Perkins in 1797. Elisha Perkins, of Norwich, Connecticut, graduated from Yale in the late eighteenth century and set up as a doctor of medicine. He invented the famous metallic tractors, two bars of metal which, when applied to the body, were supposed to relieve pain and cure disease. Other than the mental effect induced by the belief in the efficacy of the tractors, there was not the slightest value to the treatment. Nevertheless, it created a world-wide sensation. Testimonials from prominent men, particularly lawyers and preachers, came to Perkins in great numbers.

because of it). A testimonial, without experimental evidence is an insult to the mentality of an intelligent man or woman. Neverthe-

less, even intelligent and well-informed people commit errors of reasoning. Here is an instance.

In the latter part of the eighteenth century, an upright, intelligent young man with the good name of Elisha Perkins came from Nor-

MR. AND MRS. SNOW.

I ELIZABETH SNOW, of Plainfield, in the State of Connecticut, certify that in the month of June, 1795, I was forely afflicted with pains in the ancles, which had settled there after a severe fit of sickness, and had troubled me to such a degree that I became very weak and emaciated. In this unhappy situation I continued about three months, until in the month and year above-mentioned, I applied to Doctor Elisha Perkins who visited me and operated on the pained part of my ancles, with his Metallic Instruments. Immediately the pain ceased and has never since returned. I am persuaded a radical cure was at that time effected.

ELIZABETH SNOW.

Plainfield, August 3, 1796.

I the subscriber, fully concur with my wife, in the above statement of facts.

ABRAHAM SNOW.

MRS. ELIZABETH SNOW CURED BY PERKINS TRACTORS

From a pamphlet published by Perkins in 1797. The application of Perkins Tractors was as effective, no more no less, as the touching of holy relics for the relief of disease. The Tractors ceased to produce the miraculous cures after people ceased to believe in them. Possibly Mrs. Snow's pains were due to her imagination, neurotic, in which case any of the innumerable forms of faith healing, from that of the savage medicine-man to the modern Christian Science reader, would have stopped her pain. Possibly her pain would have gone away without any treatment. No matter what remedy she used, she could have attributed her recovery to it. *Post hoc; ergo propter hoc!*

wich, Connecticut, to attend Yale College. There he studied English literature, mathematics, Greek, Latin, and Hebrew—but he did not study science. There are some colleges today from which you could graduate after taking nearly the same subjects that Elisha took. You would then be educated about as Elisha was. The Greek, Latin, mathematics, and so on have not changed much since his time.

When Elisha was "educated" and had a diploma to assure himself on that point, he went back to Norwich. Some time afterwards he invented the Perkins Tractors, a pseudo-healing device that caused a tremendous sensation. The tractors were two short rods made of different metals. When you stroked the body of an ailing person with them, he subsequently recovered from his ailment. It was a clever invention, suggesting electricity at a time when Benjamin Franklin was showing that lightning was electricity, when it had been discovered that the legs of a frog twitched when touched with a bimetallic rod, and when Volta was working on the fore-runner of the electric battery. These discoveries and inventions were attracting general attention to electricity.

I said that with an application of the Perkins Tractors the sick got well. But not quite all of them—say eighty or ninety per cent of them. That is an impressive percentage, but those were the days before scientific statistics. Nobody thought to find out just how many people would recover from illness if they received no special treatment of any kind. People were always treated with something-or-other, and if they recovered, that something-or-other, it was argued, must have cured them. We know today that eighty or ninety per cent of all illness disappears without the use of any cure. But even now most people think the physician has failed to do his duty if, after he has examined them, he merely assures them that nothing is seriously wrong and that they will be well again in a few days. They want pills and gargles to aid them in their faith—that does help—and also to have something tangible to which they can attribute their recovery. For obvious reasons eighty or ninety per cent of the people who go to quacks get well—but *in spite* of, and not *because* of. Nevertheless they all attribute their recovery to the treatment they have used—*Post hoc; ergo propter hoc*—After it; therefore because of it.

The tractors of Elisha Perkins were a great success. People in all walks of life used them. The rage spread to London, and an Institute of Perkinism was established there by public subscription. Thousands of people came forward to offer testimonials. They were not ignorant people; they were prominent lawyers, preachers, statesmen, teachers, and business men. Less successful men deferred to

their judgment, and Perkins Tractors seemed for a time likely to supersede all other forms of treatment.

Then an Englishman demolished the entire fad for Perkinism. He was an unsentimental, clear-thinking sort of man, one of those cold, scientific people who school their reasoning to overcome their natural tendencies to error. He manufactured some tractors, but he

REV. DR. ROBBINS, of Plymouth.

DEAR SIR,

Sept. 24, 1796.

SEVERAL persons, since you left us, have experienced immediate relief, in various complaints, by the Metallic Points.

I operated day before yesterday on a man's hand, which was prodigiouſly ſwelled, and painful, by a wound he received on the back of it, which he neglected and got cold in. It was much inflamed; but was relieved by that ſingle operation. : The ſwelling ſubſided, and the inflammation went away, ſo that he went directly to work on board his veſſel. He told me the laſt night it gave him no trouble.'

I am, &c. CHANDLER ROBBINS.

A MINISTER GIVES A TESTIMONIAL

In ancient times medicine and religion were a common field; the priest was the physician. Even after medicine and religion separated, ministers continued for a long time to be dabblers in medical matters; the Reverend Cotton Mather offers an outstanding example, and in medicine his beliefs were often as unfounded as they were in the matter of witchcraft, although we owe to him the introduction of inoculation into America. Even in the nineteenth century some ministers continued to believe in their efficacy in healing the physical as well as the spiritual ailments of their flocks. An education in theology does not impart a critical attitude toward medical matters—quite the contrary.

made them out of wood and merely painted them to resemble metal. These counterfeit tractors worked as well as the metal ones of Perkins. The same eighty or ninety per cent of ailing people got well as quickly when their backs were scratched with a chip of wood as when they were stroked with a bimetallic rod. People lost their enthusiasm for the tractors after a demonstration as clear as this one. They turned their attention to some other medical fad and Perkinism passed away.

Windham County, August 16, 1796.

WE the subscribers certify, that from a variety of cases, which have occurred, not only in our own practice, but in that of our neighboring physicians, we are *fully convinced* of the utility of Dr. Perkins's patent Metallic Instruments, in removing various pains, spasms and inflammatory affections from the human body, and that the discovery is important to the healing art:

* JOSEPH BAKER,	} Fellows of the Medical Convention.
* JONATHAN HALL,	
* ELISHA LORD,	
* JOHN BREWSTER,	
THOMAS HUBBARD,	Member of the Medical Society.

* When this Certificate was given, Doctors Baker, Hall, Lord, Brewster, and the Author of the Metallic Discovery, represented the County of Windham in the Connecticut Medical Convention.

The following is, a List of the Names and Places of abode of some who have the Transfers, and Patent Instruments for Sale.

N ATHAN SMITH, M. D. Dartmouth College, N.H.	
John Melcher, Esq. Portsmouth,	do.
Mr. John Greenleaf,	do.
Mr. Henry Ranlett, Exeter,	do.
Doctor Thaddeus M'Carty, Keene,	do.
William Little, Esq. Boston, Massachusetts.	

A FAMOUS PHYSICIAN SELLS A QUACK CURE

From a pamphlet published by Elisha Perkins in 1797. Sad to relate, bad logic in medical matters was not limited to the laity, ministers, and lawyers; even physicians were guilty of it. Fortunately, the testimonial reprinted here was given before the days of rigorous scientific training in medical schools. The physician of today is logical in matters of medicine, but it does not follow that he is equally logical in matters of law, economics, or politics. A lifetime of training is necessary to develop logical thinking in any one field of endeavor; the trained lawyer and economist are not necessarily logical in matters of medicine.

The physicians subscribing their names to the testimonial given here were men of outstanding reputation. Dr. Nathan Smith, who is listed as selling the Tractors, was a graduate of Harvard, class of 1790, and subsequently professor of anatomy, surgery, chemistry, and medical practice at Dartmouth College, filling, as Oliver Wendell Holmes said, "a whole settee of professorships." Dr. Nathan Smith founded the medical schools of Yale, Bowdoin, and Vermont. He was the leading surgeon of his time. His grave is in the Grove Street Cemetery, New Haven, Connecticut.

In referring to the testimonials given for Perkins Tractors, I said that prominent men gave their names for this use and that lesser men were thus influenced because they trusted the judgment of these successful men. Unfortunately, manifest success in one field of endeavor does not qualify a man or a woman to pass judgment in other fields of endeavor. Many people fail to realize the fact that the advice of prominent cinema actresses may not be sound on the subject of diet, that maiden ladies, however famous as writers, may not know as much about raising children as do many mothers who have no literary attainments, and that prominent business men of sound judgment in matters of commerce may use fallacious judgment in matters of medicine.

A few years ago a man whose name I shall not mention, but who was prominent in large affairs of business, the holder of many academic degrees, and a philanthropist, gave his name freely for use in the testimonial of a proprietary medicine. There is no question that this man was sincere; he honestly believed the words he wrote.

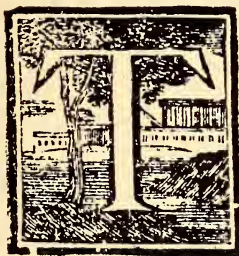
They were to the effect that he had been ill and was in consequence debilitated. On the advice of a friend he took each day three tablespoonfuls of this particular remedy. In less than a month he had recovered his customary vigor. He therefore attributed his recovery to the remedy he had used, and in gratitude for the benefit derived gave its proprietors his testimonial.

Because this man was prominent in public affairs his views were respected; his judgment in financial affairs was of proven merit. Thousands of people deferred to his opinion in matters of business; they deferred also to his opinion in matters of medicine. They purchased and used the medicine he recommended. Many of them in turn gave testimonials of its virtues.

This remedy was found to be no more beneficial than a tablespoonful of milk taken three times a day. Its sale, however, had been tremendous, because it was sold to people who could not use logic in medical matters and who did not know that all testimonials are based on the one great error of reasoning—*Post hoc; ergo propter hoc*—After it; therefore because of it.

CHAPTER THREE

THE POWDER OF SYMPATHY

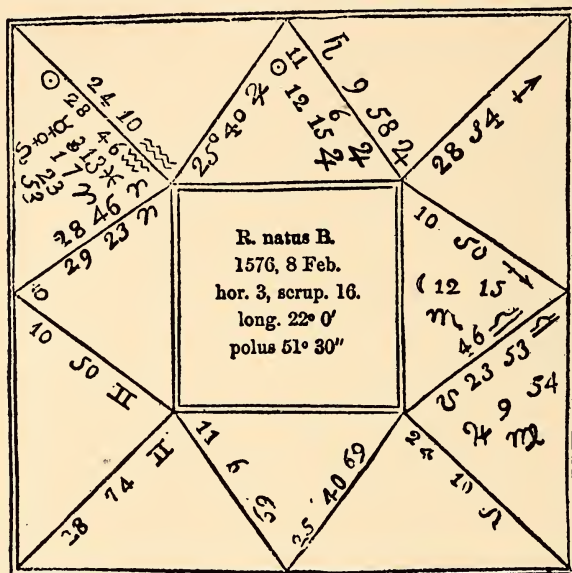


THREE hundred years ago many capable and intelligent men—often statesmen and noblemen—devoted years of their lives to designing and building perpetual-motion machines. Needless to say, all of these contraptions have long since ceased to move; the few that have survived as relics are now battered, dusty toys in Old World museums. These amateur inventors were not ignorant men according to the standards of their time. In many fields of knowledge they were well advanced. We today study with admiration and respect their literature and their art, but we do not admire or respect their science, for we have advanced so far beyond their attainments in that direction that their serious efforts seem childish to us.

Yet, with all of our progress, there are today some seventeenth-century scientists living in the twentieth century. They are the obscure, uneducated inventors who still cherish hopes of making perpetual-motion machines. They are hopelessly foredoomed to failure, for they give no cognizance to fundamental and proven principles of science. Nevertheless they strive on in attic workshops, making endless attempts to overcome friction and the force of gravity, with boundless hope and a liberal application of lubricating oil. Strangest of all, these inventors sometimes are able to interest and obtain the support of intelligent men. Most people have a surreptitious belief in the occasional accomplishment of the impossible, and a secret hope that dogmatically positive scientists who scoff at perpetual motion may be wrong, after all.

Three hundred years ago it was not unusual for prominent men with no medical training to dabble as amateurs in medical matters. Their interest turned particularly to the discovery and exploitation

of remedies of miraculous potency that would promptly cure the most distressing ailments. In short, they made home remedies quite as ingenious and quite as impractical as the perpetual-motion ma-



ROBERT BURTON'S HOROSCOPE

Burton is the author of the famous *Anatomy of Melancholy*, published in 1621, a book widely read in the seventeenth century, much admired by Dr. Johnson and Charles Lamb, and borrowed from extensively by Lawrence Sterne in the preparation of *Tristram Shandy*. It is intended to be a discussion of the causes of the madness called melancholy, but is a mine of information of the life and thought of the time; abundant in quotations from the classics. Burton, who was himself inclined to be melancholy, predicted from his horoscope that his death would occur in 1640; he died January 25, 1640. Casting horoscopes, a practice now relegated to the ignorant or superstitious, was once taken seriously even by learned men. Dryden calculated nativities, Cromwell had his lucky days, and Kepler is said to have cast a horoscope for Wallenstein.

chines of their mechanically inclined friends. I am going to tell you the history of one of the most famous of these cures, but before I do so I want to digress a moment on the subject of home remedies in general.

Now by "home remedies" I have in mind particularly those rather messy concoctions which are survivals of obsolete medical practice,

handed down in the family for years, and of which the main virtue is in the tradition associated with them. These remedies are mostly cough syrups, laxative mixtures, and liniments with the possible addition of herb extracts and syrups to act as general correctives. It is remarkable how many people there are who recognize onion soup as a food when it is served in a bowl, but think it becomes a medicine when it is served out of a bottle, or who attribute miraculous curative powers to castor-oil when given, not to themselves, but to their children. In fact, most of the home remedies find their way into the unwilling throats of infants or children, or are rubbed over their sore spots. The whole procedure is in the nature of a sort of ritual in which the mother bolsters up her courage with the belief that the disease is a mild one that can be frightened away by a brave display of home remedies.

I have said that these home remedies are usually harmless in themselves, and so they are—but they are dangerous in principle. Their use involves diagnosis by an untrained person. Many of these amateur diagnosticians are ignorant of the fact that cough syrups are not always the best treatment for coughs, that laxatives may do grave harm in threatened appendicitis, and that the pain for which the liniment is applied may be a symptom of some grave disorder that requires immediate and energetic surgical treatment. When the home remedy fails, the physician is called. If the patient survives, the home remedy gets the credit; if the patient dies, the blame is placed on the physician.

But there is one class of home remedies the exploitation of which cannot be condoned as a moderately harmless foible of the human mind. This class includes the so-called "cures" for such diseases as tuberculosis and cancer. There are hundreds, if not thousands, of such remedies in this country, each one exploited by an amateur dabbler in medical matters—a counterpart of the builder of perpetual-motion machines. Usually the exploiters of these cures have a grievance against the medical profession and well-systematized delusions of persecution. Their apparent mistreatment often awakens sympathy in others and obtains for them the following and support of sentimentalists. In fact, most of us have a tendency to give special credence to information obtained outside of conventional chan-



PREPARATION OF VIPERS FOR THE MANUFACTURE OF THERIAC

This illustration is from the 1586 edition of *Hortus Sanitatis*. The book was printed first in 1485, reprinted with elaborations in 1491, and subsequently subject to many reprintings and alterations. It is one of the earliest medical books printed; Gutenberg's *Purgation Calendar*, which was the first, was issued in 1457. The *Hortus Sanitatis* is a combined herbal and bestiary filled with colored wood-cuts of real or fanciful plants and animals and details of the use of them in treating disease. The illustration here shows a physician cutting up vipers in the preparation of theriac. This medicinal substance dates back to Mithridates, King of Pontus, 132-63 B.C., who attempted to make a universal antidote against all poison. The composition of theriac as imagined by later pharmacists probably had little in common with the original preparation. The European varieties contained a very large number of ingredients. Its preparation as a cure-all engaged the attention of pharmacists up to the eighteenth century, and was often made into a public ceremony supervised by city officials. Vipers' flesh was also a component in Vigo's plaster; live frogs and worms were other ingredients; the London Pharmacopoeia of 1618 lists this preparation as well as theriac. Ambroise Paré was bitten by a viper while watching a pharmacist prepare theriac, and Kenelm Digby fed vipers' flesh to his wife to improve her complexion. She died of consumption.

Medicinal Experiments :
O R, A
COLLECTION
O F
Choice and Safe Remedies,
For the most part *Simple*, and easily
prepared: Useful in Families, and
very Serviceable to Country People.

By the Honourable R. BOYLE, Esq;
Fellow of the Royal Society.

The Second Volume.

CONTAINING
About Three Hundred Receipts, Published
from the Author's Original Manuscripts,
and by him Recommended to the Care of
his Executors, and to be perused by some
of his Learned Friends.

Together with a large Preface, written by
the Author's own Hand.

London: Printed for S. Smith, and B. Walford,
at the Prince's Arms in St. Paul's Church-
Yard. 1693.

ROBERT BOYLE'S COLLECTION OF HOME REMEDIES

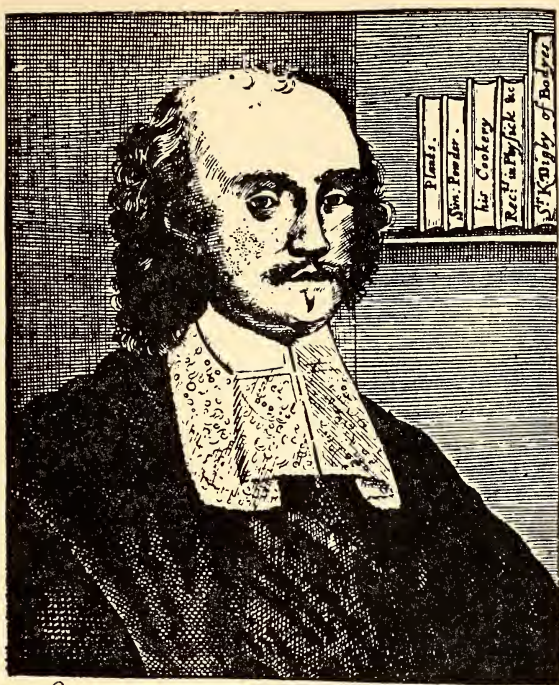
Robert Boyle served medicine well by removing from the pharmacopoeias many of the horribly disgusting remedies which even in the seventeenth century were still extensively employed, but his book of home remedies—"useful in families, and very serviceable to country people"—is full of absurd and useless mixtures, many of which are actually harmful. It is incredible today that a member of the Royal Society should write a book of home remedies; such matters are now relegated to the uneducated and the charlatans. Boyle was one of the founders of the Royal Society. He defined chemical elements, founded analytical chemistry, and established Boyle's law for the expansion of gases. But even in this field he did not escape wholly from the alchemic ideas of his time, for in 1689 he was instrumental in obtaining the repeal of the statute of Henry IV against attempts to transmute gold from lead. His interests lay also in the field of theology; by his will he founded the Boyle lectures for proving the Christian religion against "notorious infidels; viz, atheists, pagans, Jews, and Mohammedans," but wisely his bequest has the proviso that controversies among the Christians themselves were not to be mentioned.

nels; for some it is surreptitious tips on the races or stock market; for others, medical advice by non-medical men.

The grievance that the exploiters of cures have is this: they have offered their cure for cancer, or tuberculosis, or some other grave disease, to a medical organization in return, of course, for generous remuneration. When the offer is promptly rejected, the grievance results. There are usually two reasons for the rejection. The first is the same one that the engineer or even the intelligent schoolboy has when he refuses to listen to the crank who exploits a perpetual-motion machine—its obvious futility. The other is the request for remuneration.

Many people overlook one very extraordinary aspect of medical ethics. You see, medicine originated in religion, and as a profession it has retained in its principles some of the religious virtues of self-sacrifice to the suffering of others. It follows a course that must seem most impracticable to many men of commerce. It is this: A man may invent a mechanical device for the comfort, profit, or pleasure of mankind; manufacture and sell it to his financial betterment, keeping his process secret or protected by patents. He can do all this quite honorably; even if he becomes rich, no one looks at him askance—indeed, quite the reverse. Such is not the case in medicine. A physician or dentist who seeks and finds a means of alleviating suffering or prolonging life makes his discovery public that all may see and benefit without financial recompense to him. Such a procedure is followed in no other branch of human learning practiced for a livelihood. This obligation which the physician and dentist accept, and enforce, is looked upon as a natural course by all of those people who accept as equally natural quite the opposite course from all other members of society.

The inventor of a cure for tuberculosis, or cancer, or any other grave disease—if the cure is a true one and his motive sincere—may safely present it openly and freely to society in the full assurance that his reward will come after the proof of the cure, and come as both fame and fortune. But the inventor of a home remedy wants his money first, and wisely so, for this remedy loses its virtue when its secret is exposed and his grievance dispelled.



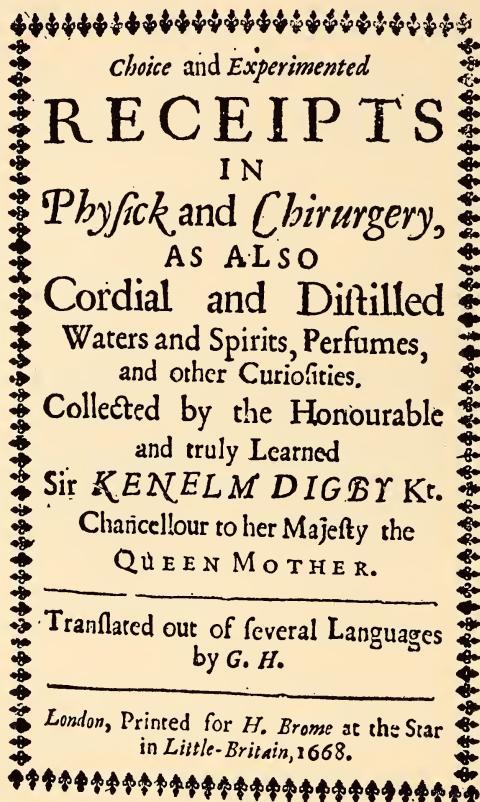
The truly Learned and Hon^{ble}
 Sir Kenelm Digby K^t Chancellor
 to the Q^{ueen} Mother
 Aged 62.

Griffiths sculp^t

SIR KENELM DIGBY AT THE AGE OF SIXTY-TWO

Sir Kenelm was a dabbler in medical matters and the advocate of the famous powder of sympathy. The illustration is taken from the frontispiece of his *Receipts in Physick and Chirurgery*, 1668. Sir Kenelm did not have the sound scientific attainments of his contemporary, Robert Boyle, but he cut a great figure in the social life of the time. He was continually embroiled in court intrigues, was on one occasion imprisoned, and was later exiled for plotting against the government of Charles I. As noted below his picture, he was chancellor to Queen Henrietta Maria, in Paris, and was sent by her on a mission to Rome, where he promised, in her name but without warrant from Charles, religious freedom in England and an independent parliament for Ireland. He was employed in diplomatic affairs by Cromwell, to the scandal of both parties. A partial list of his works is given in the titles of the books shown in the illustration.

Now I started out to tell about a historically famous home remedy. It is the Sympathetic Powder of Sir Kenelm Digby which healed wounds in a most miraculous manner three hundred years



SIR KENELM DIGBY'S BOOK OF HOME REMEDIES

Subsequently, 1677, Sir Kenelm published another book of home remedies, more in the line of a cookbook, however, called *The Closet of the Eminently Learned Sir Kenelm Digby, Knt. Opened*. His most famous remedy is contained in his monograph on the powder of sympathy, a remedy in which King James took a keen interest, so Sir Kenelm said; by merely dipping a piece of bloody clothing in it the wounds of him from whom the cloth was taken were healed.

ago—if we are to believe his statement—but which does not do so any more.

Sir Kenelm was an English courtier of the seventeenth century, a man of talent and prominence. He was a student at Oxford, am-

bassador to foreign countries, and a Commissioner of the Navy. He must have been a man of great diplomacy, for when the English Court was broken up by Oliver Cromwell and the execution of Charles I, Sir Kenelm became an associate of the new leader. At the subsequent restoration of the royal family, when Charles II came to the throne, Sir Kenelm again found favor at Court.

He was a man much given to spectacular behavior, as is instanced by an affair he had—or at least is said to have had—at the Court of France. Kenelm, just out of Oxford and about eighteen years of age, fell in love with an English girl named Venetia Anastasia Hanley, who lived on an estate neighboring that of his family's. His mother objected to the match and so sent her son off on a tour of the Continent, in the hope that a wide experience there might wipe out the youthful romance. Soon after his arrival at the French Court, experiences commenced in earnest. Kenelm was called aside by one of the ladies-in-waiting, who told him that he was fortunate beyond words in that a lady of royal birth had fallen in love with him and wished to propose marriage. In spite of twinges of his conscience at thoughts of Venetia, he suffered himself to be led to the chamber of this royal lady, who was waiting there to express her tender sentiments. He was left alone in the room. A few moments later the draperies parted and there entered the widowed Queen of Henry IV of France, who flung her arms around his neck. It was an experience for Kenelm, but not a romantic one. Margaret, however beautiful she may have been in her youth, had long since passed that period and was now a very corpulent and unwieldy woman, old enough to be Kenelm's grandmother. At sight of the royal widow, Kenelm quickly regained his constancy to Venetia and told the queen of his love for her. The enraged widow turned her back on him for a moment and Kenelm dashed from the room. Fearing her vengeance, he decided to disappear. The most convenient way to do so was to circulate the report that he had been killed in a duel. After he had done so, he set out incognito to tour Europe. The report of his death reached Venetia. She grieved for him, but some time later, when she had yielded to the courtship of Sir Edward Sackville and was on the verge of marrying him, Kenelm came to life, upbraided her for her inconstancy, married her secretly,



An Information to the Knowing Reader.

THis Exquisite Philosophicall Discourse was made lately by that Renowned Knight Sir Kenelme Digby, in one of the most famous Academies of France. It contains a variety of many recondite and high mysteries of Nature, which are all here unmasked. And as all that great Scientifical Assembly, composed of the choicest wits under that Clime, stood then astonished at the profound Speculations of the Author,
A 5 (which

A DISCOURSE ON THE POWDER OF SYMPATHY

The full title of this work, published in 1658, is *A Late Discourse Made in a Solemn Assembly of Nobles and Learned Men at Montpellier in France; by Sir Kenelm Digby, Knight, etc. Touching the Cure of Wounds by the Powder of Sympathy; with instructions how to make the said powder; whereby many other secrets of nature are unfolded. Rendered faithfully out of French into English by R. White, Gentleman, London, Printed for R. Lownes, and T. Davies, and are to be sold at their shops in St. Paul's Church Yard, at the sign of the White Lion, and at the Bible over against the little North Door of St. Paul's Church.*

and went away to Court. Venetia died while still young, and rumor had it that her end was hastened by the fact that Kenelm fed her vipers' flesh to improve her complexion. That was one of his many superstitious beliefs. At her death, Ben Jonson wrote a most gruesome elegy on her—and Kenelm let his beard grow.

It was during his European travels that he acquired his information on popular superstitions, particularly those pertaining to astrology, alchemy, and mysterious medical methods. He cast his own horoscope, but not very reliably. He did not have the courage to make it come out right, as did Robert Burton, the author of the famous *Anatomy of Melancholy*. He, so it is said, finding himself still alive on the day that his death should have occurred according to his horoscope, proceeded to commit suicide rather than admit that the prediction was in error.

It was also during his wanderings on the Continent that Kenelm discovered the Sympathetic Powder. The recipe was given to him, as is often the case in such affairs, by a mysterious stranger from the Orient who refused to impart his secret to anyone else and who disappeared immediately after he had disclosed it to Kenelm. Its Oriental origin helped to catch the popular fancy in England in the seventeenth century; in our own country there was a similar vogue for herb remedies presumed to have originated with the American Indians.

Kenelm Digby's Sympathetic Powder was a variant of a much older remedy, known as weapon ointment. That form of home treatment is mentioned in Sir Walter Scott's "Lay of the Last Minstrel."¹ In that poem, William of Deloraine had been grievously wounded in combat with Lord Cranstoun and then carried to a castle and left on the stone threshold, where Lady Margaret found him with the broken lance still in his side. She treated him in this wise:

She drew the splinter from the wound,
And with a charm she stanch'd the blood;
She bade the gash be cleansed and bound:
No longer by his couch she stood;
But she has ta'en the broken lance,
And washed it from the clotted gore,
And salv'd the splinter o'er and o'er.

¹ Canto Third, No. XXIII.

OBSERVATIONS
VPON

*Ex Libris
p. 111
Religio Medici*

Occasionally Written
By Sir Kenelme Digby, Knight



LONDON,

Printed by R. C. for Daniel Frere,
and are to be sold at his shop,
at the Red Bull in Little Bri-
taine, 1643.

SIR KENELM DIGBY'S REVIEW OF BROWNE'S "RELIGIO MEDICI"

Sir Thomas Browne was an English physician practicing at Norwich. In 1642 a copy of *Religio Medici*, which he describes as "a private exercise directed to myself," was printed from his manuscript without his knowledge. It was reviewed by Sir Kenelm Digby in the pamphlet illustrated here. So much interest was aroused that Sir Thomas put forth a corrected version. *Religio Medici* offers perhaps the best picture there is of an educated mind of the seventeenth century, keen and precise in some directions, credulous and superstitious in others. Sir Thomas attempts to reconcile scientific skepticism with religious faith. Underneath his words is often a credulous attitude toward the things he ridicules. He denounced all superstitions, but gave his professional aid to the condemnation of Amy Duny and Rose Cullender for witchcraft at Norwich in 1664. His writings belong to literature in the most exquisite sense.

Notice the treatment in those lines. Lady Margaret takes the broken lance from the wound and then applies the healing salve, not to the wound but to the weapon. Under this form of treatment, if you or a friend were stabbed, the proper procedure was to obtain the weapon and anoint it carefully with an especial ointment. It was just as well that the ointment was not applied to the wound, for, in accordance with the prevailing tradition of home remedies of that time, it was as disgusting in ingredients as were the contents of the witches' cauldron in "Macbeth."

There was one great drawback to weapon ointment. One could not always obtain the weapon for the anointing process. Sometimes the assassin carried off his dagger, or the enemy hid his sword. The poor victim of that circumstance was in grievous trouble indeed. That is where Kenelm Digby's innovation came in so conveniently. His Sympathetic Powder was not applied to the weapon, but, instead, the bloodstained clothing of the victim was soaked in a water solution of it—and the clothing was always available.

There were plenty of opportunities for Kenelm to try out his home remedy on his friends, for in his time dueling was a very common practice. The frequency with which this method was used for settling disputes can be judged from the fact that during the reign of Henry IV of France, a period of only eighteen years, more than four thousand men in that country alone lost their lives in affairs of honor, and at the same time fourteen thousand pardons were issued in duels that did not terminate fatally.

One of Kenelm's first cases was the treatment of Mr. James Howell, a prominent Englishman who had attempted to separate a pair of his friends engaged in a duel and had, in consequence, been the only one of the three wounded. King James sent his surgeon to treat the wounded man, but Kenelm was the real hero. He took a bloodstained garter, soaked it in his solution, and instantly the pain left the wound, so great was the powder of sympathy. King James became interested in the proceedings, and so Kenelm, to demonstrate his discovery, took the garter out of the remedy and dried it, whereupon the pain returned instantly.

The king asked for the secret, and reluctantly Kenelm told him. The composition soon became public property, and so Kenelm, to

Semeiotica Uranica :
OR, AN
ASTROLOGICAL
JUDGEMENT
^{OF}
DISEASES
From the Decumbiture of the sick
much Enlarged.

1. From Aven Ezra by way of Introduction.
2. From Noel Duret by way of Direction.

Wherein is laid down,

The way and manner of finding out the Cause, Change, and End of the disease. Also whether the sick be likely to live or die; and the time when Recovery or Death is to be expected.

With the Signs of Life or Death by the body of the Sick parry, according to the judgment of Hippocrates.

Whereunto is added,

A Table of Logisticall Logarithmes, to find the exact time of the Crisis *Hermes Trismegistus* upon the first Decumbiture of the sick: shewing the signs & conjectures of the disease, and of life and death, by the good or evil position of the Moon at the time of the Patient lying down, or demanding the question: Infalible signs to know of what complexion any person is whatsoever: With a compendious Treatise of Urine.

By **NICHOLAS CULPEPER** Gent.
Student in Physick and Astrologie.

Difce, sed ira cadat naso, rugosaque sanaa. Persius.

London, Printed for Nath. Brookes at the Golden Angel on Cornhill, neer the Exchange, 1658.

MEDICAL DIAGNOSIS MADE FROM THE STARS

Title page from Nicholas Culpeper's *Astrological Judgment of Diseases*. Boyle, Browne, and Digby, illustrations from whose works are given in this chapter, represent an educated and cultured group from the field of seventeenth-century medicine; Nicholas Culpeper typifies the empiric of the same period, an uncultured mind, but one guided by native shrewdness. He was a famous quack salver and herbalist, who indulged in a vast amount of well-merited ridicule at the remedies included in the London Pharmacopoeias of his time, but he shows an even greater credulity in his own practice of astrology. His work, *The English Physician*, was the first medical book published in the American Colonies, 1708, although previously, 1677, a very brief pamphlet called Thacher's *Brief Rule* had been printed at Boston. Kipling, in *Marlake Witches*, uses Nicholas Culpeper as one of his characters, the shrewd empiric.

maintain his reputation, wrote a book about it, explaining in detail the powder of sympathy. The Sympathetic Powder was nothing more or less than iron sulphate, green vitriol or copperas, an ingredient of ordinary ink. It really made little difference what the powder was; anything would have worked just as well. But on the strength of his cures Kenelm achieved an enormous reputation. A great many

*An Elegy
In remembrance of the Lady
Venetia Digby.*

THE AUTOGRAPH OF KENELM DIGBY

people testified that their wounds had been healed by the sympathetic powers of the Sympathetic Powder. But that is the way with all home remedies—all the testimonials are favorable. I shall tell you why the evidence is all on one side. Only those who are fortunate enough to recover, in spite of the remedy, are heard from, and naturally their reports are favorable. The dead give no testimonials.

CHAPTER FOUR

THE DIVINE CAGLIOSTRO



IN THE hills of Ariège, France, is a cavern called The Grotto of the Three Brothers. Some twenty or thirty thousand years ago it sheltered a tribe of those primitive men called Cro-Magnon. Traces of their sojourn still remain after all of the thousands of years that have passed since the dissolution of the tribe; bones and knives, tools and weapons, left in that dry stone cave, have been preserved against the devastations of wind and rain. On the walls of the cavern are crude drawings made by Cro-Magnon artists; there are hunting scenes showing animals, now extinct—the mammoth and the rhinoceros that once inhabited France.

There is pictured there also the first known representation of a physician, the tribal medicine-man. He is shown clothed in the skin of a deer, and he bears upon his head the antlers of that animal. He presents a fantastic appearance, which no doubt to the eyes of his primitive tribesmen was fearsome and awe-inspiring. That impressive appearance was the medicine-man's main asset in the practice of his healing art.

His general methods of treating disease have survived in the practice of the medicine-men of all native and primitive peoples. The principle upon which the practice is based passed also, as you shall see, into the hands of the medical charlatans and quacks of civilized people, even of today.

Primitive peoples believe that disease is due to supernatural forces. They conceive of sickness as resulting from the actions of demons and devils who thus torment them; as due to the malevolent influence of spirits from animals, or trees, or rivers; or from the enchantment of sorcerers. It is the business of the medicine-man to



PORTRAIT OF THE FIRST PHYSICIAN

A painting on the walls of a grotto in Ariège, France, made by a Cro-Magnon artist twenty or thirty thousand years ago. This is the earliest known portrait of a doctor—the tribal medicine-man. At that period all medical treatment was a form of mental therapy, faith healing. The medicine-man with his grotesque costume attracted the sufferer's attention, taking his thoughts away from his pain; by his appeal to the spirits and his ritualistic behavior he inspired confidence of recovery. This kind of treatment, which has its counterpart not only in the crude procedures of savage medicine-men of all subsequent time, but also in the more refined ritual of the modern mental healer, will relieve pain and bring about an optimistic state of mind, but it will not cure such diseases as cancer and diphtheria, nor will it set broken bones and fill decayed teeth.

drive away the demons, placate the spirits, and outwit the sorcery of the enemy. He makes an outward show of attempting to do these things, but what he really does is to distract the patient's attention from his suffering by inspiring him with the belief that the cause of the disease has been removed. He gives him confidence of recovery. His treatment is entirely upon the mind of the patient—it is a crude sort of mental healing. To fix the patient's attention he dresses fantastically; he clothes himself with the skin of some animal, covers his face with a grotesque mask, and adorns himself with teeth and skulls. He shouts and dances and waves a rattle. When his personal treatment is completed, he provides his patient with an amulet—a token—to keep about his person as something tangible with which to maintain confidence.

The method used by the medicine-man in treating disease is essentially the same as that used today by the father of the young child who has bumped its head. The father dangles his watch before the child, or contorts his face, or behaves grotesquely to make the child "forget its hurt," stop crying, and smile. He then gives the child a piece of candy as an amulet to keep attention distracted until the pain is gone.

This procedure of the father and of the medicine-man relieves pain, but it heals no broken legs, nor does it cure measles or small-pox or cancer. It takes the pain from an aching tooth, but it fills no cavity.

Pain is the supreme, subjective phenomenon of disease, and it is almost wholly mental. A man during rage feels no pain from injury; after his anger has cooled, pain sets in. The same man waiting in the anteroom of a dentist's office may suffer more in anticipation than he will at the hands of the dentist. The early Christians while being burned at the stake signaled to their friends, who waited for the ordeal, by raising their seared arms in the flames to signify that they felt no pain. Religious enthusiasm was their anesthetic, as it has been for many fanatics who have voluntarily mutilated their bodies. Pain may be relieved by faith, but the Christians burned just the same.

On the other hand, the workings of the imagination may affect the actions of the body so that the symptoms of disease are counter-



THE SAVAGE MEDICINE-MAN

His procedures are the same as those of his Cro-Magnon predecessor of 20,000 years ago.

feited. Some years ago, after minor railroad accidents, it was a common occurrence for some of the passengers to develop stiff backs. The condition was called "railroad spine." It was invariably cured



A MEDIEVAL SAINT EXORCISING A DEMON

Here, as in the case of the Cro-Magnon doctor and the savage medicine-man, the treatment is the same; only the form has changed. The medieval saint shown in this old wood-cut is displaying a form of superstitious medicine. Belief in possession has a direct descent from the superstitions of primitive savage men. They believed that disease and all other misfortunes resulted from persecutions by malign spirits. Generally the spirits exercised their influence merely from the outside, but occasionally, particularly in insanity, they were supposed to inhabit the body. The spirit then spoke with the voice of the man. The Romans believed in good demons as well as bad and that they afforded advice and guidance, as in the case of Socrates. They also believed in possession; Roman assemblies disbanded in the event of a member suffering an epileptic seizure, because of the presence of an evil demon. Among the Christians all demons were evil, and the faithful attributed most of their sufferings to the malign influence of these imaginary creatures.

when the railroad company paid damages; nothing else seemed to aid it. Homesickness and lovesickness are really diseases, and no medicine is so good for the one as a trip home, while marriage is a permanent cure for the other. During the war some men developed a nervous disease known as shell-shock. The symptoms of

their disease were physical; they became lame, palsied, and even blind. The ailment was mental, and they were cured by mental therapy which restored their confidence in themselves and helped them to adjust themselves to their unpleasant situations.

There are many men and women in time of peace who are illy adjusted to the conflicts of life, and they develop peace-time shell-shock as an unconscious evasion of responsibility. This disease does not respond to pills or elixirs, but it does respond to restoration of confidence and belief in recovery. Men and women bedridden with rheumatism, or even paralyzed for years, have occasionally—but only occasionally—been known to get out of bed and stagger to safety when the house was burning down about them.

There is even a mental aspect to diseases which are entirely physical in their origin; the sufferer wasting away with advanced cancer may for a time get better, gain weight, and become optimistic under a new, but useless, treatment. Mental treatment does not cure cancer; it may cheer the patient, but the disease soon takes a turn for the worse and the patient dies. Suffering exists only in the mind; but unfortunately most diseases have an objective existence. For such diseases mental healing does not save life. In fact, it often leads to loss of life from neglect of other methods of treatment.

Mental treatment is one of the adjuncts of modern medicine; it is applied only when careful and exact diagnosis has ruled out the presence of physical disease. Mental healing alone, without the discriminating diagnosis, is a dangerous practice. It is the form of treatment used by the medicine-man of primitive peoples. He knows no other. His tradition, his philosophy, and his art have been carried over into the practice of the charlatan of all ages. The medical quack of today is merely a primitive medicine-man in changed surroundings, with modernized appurtenances to inspire belief and confidence.

The grotesque actions of the medicine-man and the foolery of the father of the small child suffice to impress unsophisticated minds, but for civilized adults something more subtle is needed to bring relief. Consequently, the charlatans of all ages have played a part corresponding to prevailing beliefs and novelties. Two hun-

dred years ago they turned to alchemy, mystery, and magic; today they exploit radio vibrations, strange metaphysics, and gland transplantation.

To illustrate the technique of the savage medicine-man in civilized surroundings, I want to tell something from the life of the



THE FAMOUS COUNT CAGLIOSTRO

A charlatan of the eighteenth century who practiced faith healing. At that period he could not invoke the idea of spirits and demons, as had his predecessors. He turned instead to alchemy, the elixir of life, rejuvenating powders, rheumatism chairs, and beds that assured painless childbirth.

greatest medical charlatan that ever lived—the famous Count Cagliostro of the eighteenth century.

In the year 1791 there was printed in London a translation of a document, now very rare. It is the proceedings of the court of the Inquisition at Rome, which sentenced one Joseph Balsamo—better known as Count Cagliostro—and his wife, Lorenza, to life im-

prisonment in the castle of St. Angelo. It gives also a *resumé* of the life of this man who created a tremendous furore in Europe, who had an enormous following, who was called the "Divine Cagliostro," and who was finally implicated in the scandal of the queen's necklace, one of the factors precipitating the French Revolution. Cagliostro is a central character in the novels of Dumas dealing with the Revolution, and is treated with great consideration by that author.

I am going to show you Cagliostro first in his prime; later we shall see something of his early life. Cagliostro, when we first meet him, has come out of Russia, and he has left that country rather hastily at the request of Catherine the Great. His exploits in her country have not been commendable; he has said that he could cure anyone of anything, and accordingly has been presented with a bald-headed man, with the request that he cause hair to grow on the scalp. Even his confidence failed at the task—it was left for later-day exploiters to extend their mysteries to that field.

But we shall overlook this error on his part and join the throng that visits him at Strassburg. He arrives there in a magnificent carriage, attended by footmen and servants. With great pomp and ceremony he is ushered into the most luxurious accommodation that the leading inn can furnish. He and the beautiful Lorenza shut themselves in their room; exotic foods and wines are served them. His servants move among those at the inn, and the gossip starts. It is whispered that the count is a sorcerer, a magician, an alchemist who can transmute lead into gold, the possessor of the philosopher's stone and the elixir of life.

Even the servants take on some reflected glory and mystery. One of them, when asked how old the count is, replies that he does not know exactly, since he has been with him only a few hundred years; the agreement of employment he recalls well because it was signed at Rome the day Cæsar was assassinated. Such crude "hokum" could not pass today, but eighteenth-century tastes in such matters were not refined.

The count himself is a member of a world-wide secret society that has members in Strassburg. The officers of the lodge visit him in his chambers. They are entertained with due condescension by the

great Cagliostro. He amuses them with reminiscences of the part he played in the Trojan wars, tells of personal conversations he had with Helen of Troy, and speaks disparagingly of Cleopatra's beauty,

T H E
L I F E
O F
J O S E P H B A L S A M O,
COMMONLY CALLED
C O U N T C A G L I O S T R O :

CONTAINING THE
SINGULAR AND UNCOMMON ADVENTURES OF THAT
EXTRAORDINARY PERSONAGE FROM HIS BIRTH
TILL HIS IMPRISONMENT IN THE CASTLE OF ST.
ANGELO.

TO WHICH ARE ADDED,
THE PARTICULARS OF HIS TRIAL BEFORE THE IN-
QUISITION, THE HISTORY OF HIS CONFESSIONS
CONCERNING COMMON AND EGYPTIAN MASONRY,
AND A VARIETY OF OTHER INTERESTING PARTI-
CULARS.

Translated from the Original Proceedings published at Rome by Order of
the Apostolic Chamber.

WITH AN ENGRAVED PORTRAIT OF CAGLIOSTRO.

L O N D O N :
PRINTED FOR C. AND G. KEARSLEY, NO. 46, FLEET-STREET.
M.DCC.XCI.

A CAUSE CÉLÈBRE

Title page of eighteenth-century pamphlet on Cagliostro. This work, published in 1791, purports to give the life of Count Cagliostro and his wife, Lorenza. It includes a translation of the proceedings at Inquisitorial Court at Rome by which Cagliostro was condemned to imprisonment. The self-styled count came into disgrace in Paris through his participation with Comtesse de Lamotte and Cardinal Rohan in the scandal of the Queen's Necklace.

from first-hand knowledge. He also tells them that he has a marvellous healing power and will gladly treat any poor people without charge. He will have nothing to do with the wealthy—that will come later when he has built up his reputation.

Next day the sick appear; an army of the lame, the halt, and the blind besiege him. Five hundred a day and more he treats. He makes the sign of a serpent on their foreheads, puts a drop of elixir on their lips, and straightway they are cured. Canes and crutches are thrown away, bent backs straightened out, and pains disappear. Day by day this continues, until bigger game is sighted. Cardinal de Rohan visits Cagliostro. As a great favor the healer condescends to treat a relative. Fortunately for the count, that relative recovers within the course of a week. Rohan is grateful; he is charmed by the elegant manners of this strange man, and, most of all, he is intrigued by the idea that he can convert lead into gold. He suggests that they go together to Paris. Cagliostro is more than willing to do so. He now has a patron; it is time also that he leave Strassburg, for some of the sick he has cured are sick again and more severely than before, and many have died.

In Paris he again treats the sick, but this time he includes the profitable rich. He sells chairs which cure rheumatism merely by sitting in them, powders that make women beautiful, and an elixir that restores youth to decrepit rakes. He is the rage in Paris; he is the Divine Cagliostro of the Paris *salons*; a seemingly endless stream of gold flows into his pockets. Great artists paint him, and sculptors model him. Fans and jewelry in the vogue carry his picture—not a very alluring picture, for he is an extremely gross individual.

Reputation, which is the mainstay of charlatanry, is lost more quickly than it is gained. At the height of his popularity he becomes involved in the scandal of the queen's necklace. Rohan is secretly infatuated with the queen, Marie Antoinette. Comtesse de Lamotte, an adventuress, knowing of this fact, obtains Rohan's signature to notes of security for a diamond necklace which, she says, the queen wishes to purchase secretly. Lamotte takes the necklace; the queen knows nothing of the whole matter. The notes fall due, and Rohan is unable to pay. The matter comes to the attention of the queen and she promptly causes the arrest of Rohan and Lamotte. Cagliostro is implicated, and with the others is arrested and imprisoned in the Bastille. At his trial he is judged innocent, but he is no longer the infallible healer. He is shown in the docks to be an ordinary human being. Paris laughs at him. His reputation declines and his

M E M O I R S
OF THE
COUNTESS DE VALOIS DE LA MOTTE:
CONTAINING A COMPLETE
JUSTIFICATION OF HER CONDUCT,
RELATIVE TO
THE DIAMOND NECKLACE;
ALSO
THE CORRESPONDENCE BETWEEN
THE QUEEN AND THE CARDINAL DE ROHAN,
AND CONCLUDING WITH
AN ADDRESS TO THE KING OF FRANCE
Translated from the French, written by herself.

"My griefs cry louder than advertisement."
SHAKESPEARE.

THE SECOND EDITION,
With Alterations and Additions.

L O N D O N:
PRINTED FOR THE AUTHOR,
And sold by J. RIDGWAY, York-street, St. James's-square.
MDCCLXXXIX.
[Entered at Stationers Hall.]

COMTESSE DE LAMOTTE ACCUSES MARIE ANTOINETTE

Title page of the Comtesse de Lamotte's justification. An English translation of the correspondence in the scandal of the Queen's Necklace in which were involved Cagliostro and Cardinal de Rohan. The Parisian jewelers, Boehmer and Bassenger, collected stones for a necklace which they hoped to sell to Mme. DuBarry, favorite of Louis XV, and after his death to Marie Antoinette. The queen refused to purchase them. Louis, Cardinal de Rohan, whose mistress was Jeanne de St.-Reney de Valois, wife of a *soi-disant* Comte de Lamotte, was anxious to gain favor with the queen. The Comtesse de Lamotte, probably aided by Cagliostro, persuaded de Rohan that she had been received favorably at court. She then pretended to carry on a clandestine correspondence, to which she forged the queen's name. Among these forgeries was an authorization to de Rohan to purchase for the queen the famous necklace. Marie Antoinette became aware of the intended transfer, allowed it to take place, and then had de Rohan, Lamotte, and Cagliostro arrested. The husband of Comtesse de Lamotte is believed to have escaped to London with the jewels. After a sensational trial the cardinal and Cagliostro were freed, but the comtesse was condemned to be whipped, branded, and shut up in the Salpêtrière. The comtesse escaped from this hospital, and, having taken refuge abroad, published the *Memoirs*, in which she accuses the queen of conspiracy. There is believed to be some grounds for this accusation.

healing powers fail. He is imprisoned once for debt, and then he and Lorenza go to Rome. They are arrested there for taking part in a secret society. They are tried and condemned to imprisonment for life.

The records of the proceedings of that trial tell of the origin of Count Cagliostro. He is Joseph Balsamo, an uneducated rascal, born in Palermo, and run out of that town for cheating a gullible jeweler in a spirit seance. He is a thief and a rogue. He obtained the money to make his first impressive appearance in European capitals by a common form of blackmail. After Lorenza had sought out wealthy men and inveigled them into compromising situations, the outraged

The Countess de la Motte, who lately jumped out of a two pair of stairs window to avoid the bailiffs, died on Tuesday night at her lodgings near ASTLEY'S Riding-school. August 1791

THE NOTICE OF THE DEATH OF COMTESSE DE LAMOTTE

The newspaper clipping reprinted here was found stitched to the title page of the copy of the Comtesse's *Memoirs* shown in the previous illustration. Unfortunately, the source of the paper was not given, although the date "August 1791" is penned in the corner.

husband would appear on the scene, with the result that the victims would pay dearly for their escape. Balsamo's life was one of gross deception and knavery, and worst of all he imposed upon the sick, who were poor, in order to build a reputation by which he might impose upon the rich.

In the preamble to the proceedings of his trial is a statement expressing surprise that the credulity of the people was sufficient to countenance the actions of so outrageous an impostor. It leads on to this statement: "But when it is recalled that this adventurer flourished in the eighteenth century"—that is the time the document was written—"during a period which arrogates to itself the title of an enlightened and philosophic age, infinitely superior to prejudice—the admirers of the present time ought to be covered with salutary confusion." That statement could be written in and applied to any age—even the present. We today do not regard the

eighteenth century as an enlightened and philosophic age, infinitely superior to prejudice. We think of our present time as more nearly fulfilling those conditions. From our sophisticated viewpoint we are not surprised that the people of the eighteenth century were gullible, but the fact remains that we are just as credulous. I believe that if Count Cagliostro were to appear today in a modernized edition sup-



MARIE ANTOINETTE ON THE WAY TO EXECUTION

A sketch made during her journey to the guillotine; she is seated in the cart, her hands tied, and her hair cut short, to be out of the way of the blade.

ported by national advertising he would obtain as great a following as he did one hundred fifty years ago. The outward forms of charlatanry change with the conventions of the time; but its principles do not alter, and neither does credulity.

Cagliostro is out of date, but he has many modernized followers in this country. It is conceivable, of course, that even the count himself is among them, for although he was presumed to have died in 1795, and certainly was buried then, he nevertheless on his own statement was several thousands of years old at the time, and had

an elixir of life that assured him perpetual existence. Perhaps under a different name he still sells his elixir of life, but if he does, he has changed his bait for the gullible; to correspond to present fads he would exploit it as a means to rejuvenate old men who are both credulous and wealthy.

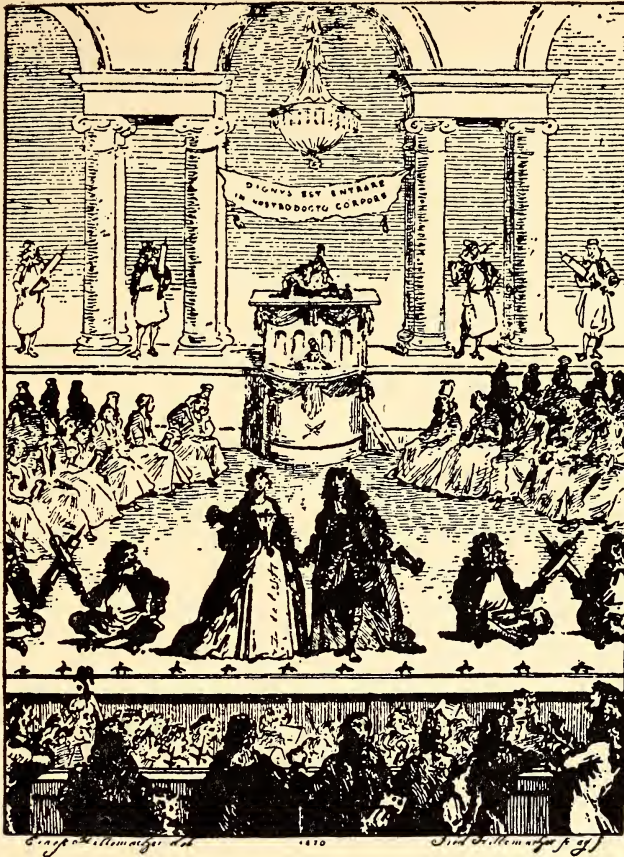
CHAPTER FIVE

THE BEZOAR STONE



FRENCHMAN by the name of Jean Baptiste Poquelin, who lived in the seventeenth century, cherished a grudge against the medical profession of his time. It was based on personal grievances. He suffered from consumption, and the disease steadily grew worse in spite of all the efforts of physicians to control it. He blamed them also for failing to save the life of his only son and that of one of his nearest friends. Other men have occasionally had ill will towards members of the medical profession, but few, indeed, have had the opportunity to proclaim it as he did. He wrote plays; in fact, he was one of the greatest of all dramatists; he is perhaps better known under his pseudonym—Molière.

With his facile pen he dissected both the medical and religious practices of his time. In comic satire he exposed to ridicule the ineptitude, the pedantry, and the professional bluff of the Paris medical faculty. It is to the credit of these physicians that they laughed with Molière; he fared less fortunately from the members of the clerical profession. He died without benefit of clergy, but I suspect he would have said that he died with medical aid. The physicians could afford to laugh at Molière's satires because when he exposed their ignorance he was exposing merely the ignorance of the time, patient as well as physician. Even the most serious-minded physician could chuckle over the inimitable burlesque of the medical consultation in the play "L'Amour Médecin." Five physicians, in the best professional manner of the time, solemnly bend their furrowed brows over the momentous question of whether it befitted their dignity better to ride to their patients on a mule or on a horse.



LA CEREMONIE DV MALADE IMAGINAIRE

MEDICAL SATIRE

A scene from Molière's *Comédie ballet, le Malade Imaginaire*. This was the last play written by Molière. In 1673, sick unto death, the great playwright wrote this comedy of the man sick only in imagination. In his fourth appearance in it Molière was seized with a convulsion which he covered over with a forced laugh. After the play was over he was carried home; he died that night.

The intermezzo ballet is one of the choicest bits of medical satire ever written, a burlesque on the long and elaborate ceremonies of the French medical graduation of the seventeenth century, during which the newly-fledged licentiate was inducted into a sort of mystical union with the faculty. In the scenes shown here the novitiate is besieged with medical questions to which he gives absurd answers in mock Latin. After each one the members of the chorus, brandishing clysters, respond with:

"Bene, bene, bene, bene respondere,
Dignus, dignus est intrare
In nostro docto corpore."

It is in this same play that one of the characters expresses the opinion that there is nothing so calculated to restore a drooping young lady to health as "a handsome set of diamonds, rubies, or emeralds."

I don't know whether in that line Molière was merely expressing the result of a personal observation, or whether beneath the sur-



THE SCOLD'S BRIDLE OR BRANKS

An instrument formerly used in England and Scotland for the punishment of scolding women and also occasionally applied for street brawling and abusive language. Many forms of branks have been used; some consisted of iron headpieces locked in place, with a flat bar entering the mouth and pressing down the tongue; others had iron head cages with the mouth plate armed with spikes. The woman with this contrivance on her head was marched through the streets or chained to the pillory to be giped at by the passers. A scold's bridle was used as late as 1856 at Bolton-le-Moors, Lancashire.

face there was a subtle jibe at a peculiar medical superstition still current in his time—the use of precious stones and jewels as medicaments. Before you smile too broadly at the physicians who once dissolved pearls in vinegar and gave the mixture to their patients, or at parents who suspended emeralds from the necks of their children to ward off fits, remember that men and women still buy birthstones and month-stones for better luck, and ladies of today

wear the ancient amulets around their necks not to prevent convulsions, it is true, but for decoration.

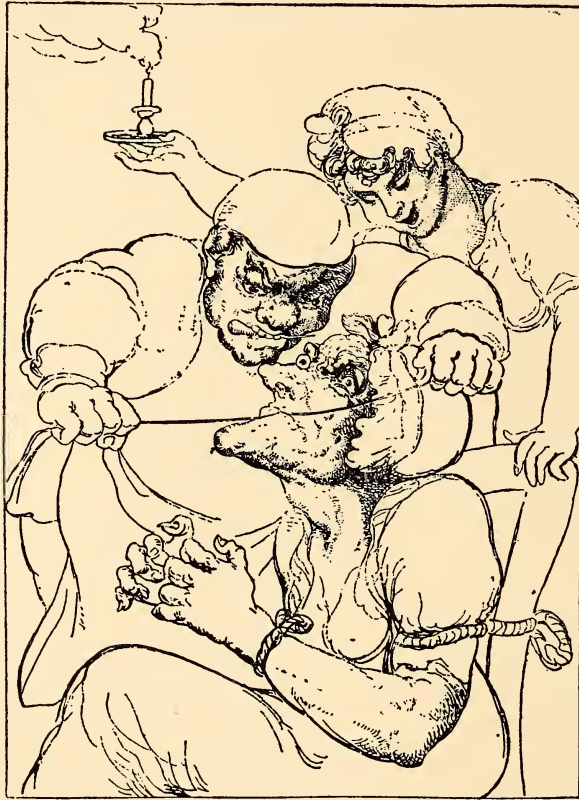
In bygone days the nobility of Europe paid fabulous sums for small pebbles, called bezoars, which were believed to be universal antidotes for poisons. These stones were concretions formed in the intestines of sick goats. Ladies of today pay fabulous sums for similar concretions found in sick oysters, called pearls.

Superstition has always centered about rare stones and gems. Formerly these superstitions were mainly medical; stones were esteemed equally for their rarity and for the supposed protection they gave against disease, injury, and misfortune. The gem lore of bygone days was not all superstition; some of it was founded on logical deduction. There is, as an instance, that old remedy for a nagging wife—have her hold a gem in her mouth during all her waking and otherwise talking hours. It was an efficacious remedy that no doubt brought peace and quiet to many a household. But I am going to deal here with less logical beliefs, with the superstitions about the curative powers of rare stones. I want to tell particularly about the bezoar, but before I do so I am going to digress a moment on superstitions in general.

Superstition is the bond that ties us to our primitive ancestors. It is the savage natural self of man showing through his veneer of civilization and education. To say you are superstitious means that you are governed by emotion and not by reasoning, by fears and not by facts. Superstitions started with primitive man.

That early relative of ours who lived long before the days of civilization was not a care-free Adam dwelling in the midst of an abundant Eden. He was a terror-driven, ignorant savage, living in a hostile world. He trembled before the lightning and fell prostrate before the thunder. Even as he crouched and shivered in a world that brought him only pain and misfortune, he sought an explanation for his plight. He did not sift the facts before him dispassionately, searching for their relation. Fear overwhelmed his reason. He developed superstitions and not science. Like a child frightened by darkness he peopled the world about him with creatures of his imagination. In the trees, the rocks, and the rivers he saw spirits, malign and vengeful, which must be propitiated with ceremonious

acts in order to preserve him from misfortune at their hands. By these acts he acknowledged their superiority and his inferiority, just as does a superstitious modern man when he taps wood for fear that his optimism will call down the disapproval of the fates and tempt



A COBBLER'S CURE FOR A SCOLDING WIFE

Rowlandson suggests here a simpler and more permanent form of bridle for a scolding tongue.

them, unless he acknowledges their superiority, to show their powers by bringing him misfortune.

Modern man thinks and feels the same way that primitive man did. Man's emotions and instincts have not altered in the lapse of time; man has not changed his way of thinking or feeling any more

than he has changed his way of seeing or hearing. But he has this advantage; he now has the accumulated knowledge of the past to guide him.



APPLICATION OF A BEZOAR STONE TO A VICTIM OF POISONING

A wood-cut from the *Hortus Sanitatis*, edition of 1483. The bezoar stone is a concretion, similar to a gallstone, found in the alimentary organs chiefly of ruminants. The kind most prized was the Oriental bezoar, which showed concentric rings in its structure when cut into. The variety found in the Peruvian llama resembles bone; German bezoars from the chamois are composed of interlaced hair cemented together with organic matter. Bezoar stones are still used in the East for medicinal purposes, but the practice has ceased in the West. Until the eighteenth century, however, they were highly prized in Europe because of their supposed virtue as an antidote for poison. Oliver Wendell Holmes, in his *Medical Essays*, states: "Governor John Winthrop, the first, sends for East-Indian bezoar. . . . Governor Endicott sends him one he had of Mr. Hunfrey. I hope it was genuine, for they cheated infamously in the matter of these concretions."

All children are born superstitious; they reason as did primitive man. We elders often pander to their superstitions. We help them

personify the trees and animals and rivers. We tell them stories of talking bears, and whispering trees, and murmuring brooks, and fairies and pixies and such benign demons as Santa Claus. Then abruptly we tell them to forget these things; through the process of education we attempt to draw the child away from its savage natural self. We attempt to discipline its emotion and its reason until it is brought up to the level of civilization to which the older generation has attained.

Without this never-ending process of guidance and education, mankind would, in a single generation, sink again to the level of savagery. A race can deteriorate as well as advance. The best educated man is only one generation removed from savagery. Many men extensively schooled in culture are uneducated; in spite of their culture they may be superstitious. The training of the emotions to appreciate beauty is culture, but it is not education. Education is the training of the intellect to appreciate reason. Education is the force which overcomes superstition.

We are vastly better educated than our ancestors of only a few generations ago. We have given up most of the great superstitions. We no longer whip the flooding river to discipline its evil spirit as did the Egyptians and Romans. We no longer fear ghosts nor do we believe in witchcraft and burn witches or exorcise demons that cause sickness. But for all of our schooling we still retain some of the marks of our former superstitions. Our failure to accept fully and to utilize fully the discoveries of modern medical science, our tendency to disregard the facts, to respond instead to fads and fancies of popular beliefs, marks our superstition.

I started out to tell the medical superstitions about jewelry that once were the accepted beliefs. In bygone days, agate cured the bite of spiders, stopped the pain of headache, and arrested the bleeding of wounds. Beryl, when swallowed, healed quinsy and, when pressed on the lids, cured disease of the eyes. The carbuncle worn about the person brought relief from worry and freedom from mental disease. Coral drove off malarial fever and, set in the collar of a dog, prevented madness. Red coral worn about the neck changed its shade with the state of the wearer's health. The diamond cured malaria and, swallowed as a powder, was supposed to be a poison—



EXTRACTING A TOAD STONE

Wood-cut from the *Hortus Sanitatis*, 1483 edition. The toad stone was believed to be found in the head of the animal, as is instanced by Shakespeare's lines, "As You Like It," Act I, Sc. I:

"Which like the toad, ugly and venomous,
Wears yet a precious jewel in his head."

The toad stone was supposed to be not only an antidote against poison, but also to give warning of its presence by becoming very hot. The stone was so set in a finger ring that it touched the flesh, thus allowing timely notice of the poison in any food or drink offered the wearer. The great Erasmus records that during a pilgrimage to the shrine of the Virgin at Walsingham, Kent, England, he saw there a remarkable toad stone.

Mad stones and snake stones, used to treat dog and snake bites, respectively, were usually very light and porous. When placed against the wound, they adhered, absorbed fluid like a sponge, and, because of the weight of the absorbed fluid, finally fell off. After they had become dry they were again ready for use.

which it is not. The emerald suspended from the neck warded off convulsions; tied about the ankle of a woman, it assured an easy childbirth; and swallowed, it cured dysentery. Powdered jade relieved heartburn, and jasper cured heart-disease. The sapphire was a remedy for typhoid fever and snake-bite. The topaz assured a long and healthy life, beauty, and intelligence. Pearls dissolved in wine were a potent remedy against the remaining ills to which the flesh is heir. Jewels were plentiful, and sickness vastly prevalent.

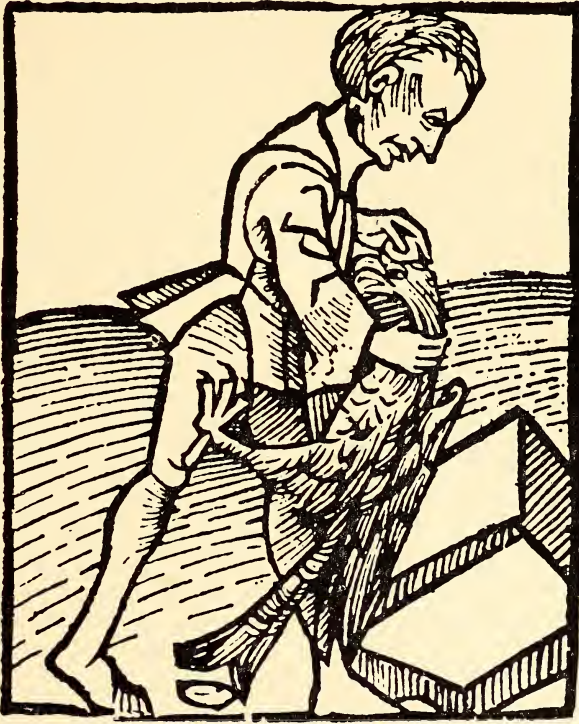
But there was one particular stone used in medicine which cannot now be purchased in any jewelry store; it can be found only in museums. It is the bezoar, once the most cherished possession of royalty. In the inventory of Queen Elizabeth's crown jewels, made at the accession of James I, there is this item:

Also one great Bezar stone, set in goulde that was Queen Elizabeth's, with some Unicorne's Horn, in a paper; and one other large Bezar stone, broken in pieces, delivered to our owne hands, by Lord Brooke the two and twentieth day of Januarie, one thousand six hundred and twenty and two.

Queen Elizabeth, like most people of her time, made no secret of her superstitions, for they were the accepted beliefs. To ward off disease she wore suspended from her neck a piece of gold engraved with mystical characters, and her bezoar stones were her infallible antidotes against all poisons. It was a very useful medicament in those bygone days when the art of poisoning was highly developed. In cases of suspected poisoning the bezoar was swallowed and recovery was assured. If the bezoar failed, the explanation was simple—the patient died of something else.

All superstitions, even medical ones, must have their picturesque background. Here is the legend of the bezoar. According to the current belief the stone was obtained from the deer and in this wise: At certain seasons of the year these animals had a sudden and overwhelming impulse to stamp their front feet over snake burrows. In response the snakes promptly came out. The deer then ate them. In consequence of this dietary indiscretion the deer developed intense stomachaches, whereupon they immediately dashed to the nearest pool of water and plunged in. There they remained with only their nostrils projecting above the surface until the water had cooled their feverish bodies. Their suffering brought tears to their

eyes and these congealed beneath the lids as stones. As the animals stepped out on the banks of the pool, these bezoar stones fell from their eyes and men gathered them from the sand. Thus the deer



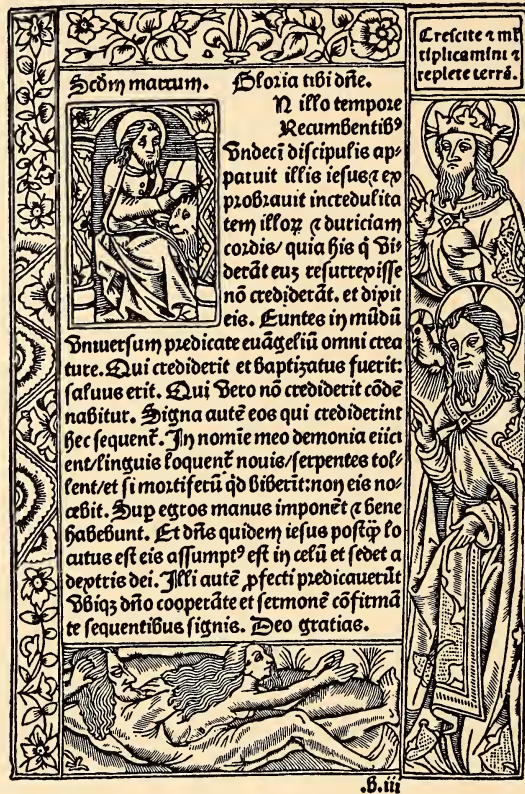
EXTRACTING AN ALECTORIAN, OR COCK STONE

Wood-cut from the *Hortus Sanitatis*, 1483 edition. There was a popular belief that this stone was found in the gizzard of a cock which had been caponized when three years old and had lived seven years longer. The alectorian was prized by wrestlers, for if held in the mouth it continually quenched the thirst; the invincible Milo of Croton is said to have owed many of his victories to the possession of such a stone. The alectorian was believed to bring luck in gambling and love; the great astronomer, Tycho Brahe, carried one and put much confidence in its supposed virtues.

suffered much that men might obtain the sovereign remedy against poison.

In reality the origin of the bezoar stones was much more prosaic than this poetic version would lead us to believe. They were, as I have said, pebbles found in the intestines of goats and other animals.

They resemble gall-stones. Their medicinal value is the same as that of any ordinary piece of gravel.



BIRTH OF EVE

The lower marginal illumination of the *Book of Hours*, published in 1492, shows the birth of Eve from the rib of Adam. As in all representations of this scene the deep sleep of Adam is apparent, the point which Dr. Simpson used with such telling effect in contraverting the religious objections to the use of anaesthesia. The belief that man has one less rib than woman persisted until well into the sixteenth century.

The name, bezoar, is derived from the Persian words meaning "expel poison." The pebbles were first popularized by the Arabs, who had many superstitions about stones. They came into use in Europe about the twelfth century and because of the high price they

commanded were usually a remedy only of the nobility. These ugly gray or brown pebbles were set in elegant gold frames and worn, ready for instant use. Many physicians of bygone days, however, were not so thoroughly convinced of the efficacy of bezoar stones as were their royal patients. One of these men expressed the general disbelief in these words: "Princes and nobles prize the bezoar very highly and guard it in their treasures among their most precious gems; so that the physicians are forced, sometimes against their better judgment, to employ it as a remedy."

One would naturally think that the first thing to occur to anyone would be to test out the supposed virtues of the bezoar stone as an antidote. Few people, however, ever test out their superstitions. They accept them on faith, and it never occurs to them to doubt their beliefs. It is amazing how blind to actualities even intelligent people may be. The great Greek philosopher, Aristotle, is said to have originated the belief that women have fewer teeth than men. That statement was accepted as a fact until only a few hundred years ago, when some one had the supreme inspiration of counting the teeth. One of the great contributions of modern science is that it educates people to look for facts. The belief that man had one less rib than woman because of the origin of Eve persisted until the sixteenth century, although all that anyone had to do to disprove it was to run his finger over the ribs and count them. Superstitions make us blind to the most obvious facts.

Indeed, the first attempt to test the virtue of the bezoar stone lost its effectiveness because of this kind of blind reliance on superstitious belief. This test was made in the sixteenth century on the bezoar that belonged to Charles IX of France. This king was superstitious in many matters of medicine. One of his beliefs centered about the testing of his wine for poison. Every time he was served, an attendant dipped into his cup a piece of unicorn's horn. This particular horn had come into the king's possession as one of his mother's wedding gifts presented to the family by Pope Clement VII. It had cost a fabulous sum. There is not, nor was there ever, such an animal as the unicorn. The ivory was probably from a narwhal. According to superstition it was supposed to change its color if there were poison in the wine. In reality the poison had

no effect on the horn. But no one had thought to try the simple expedient of adding poison to the wine, dipping a piece of horn



AN ARABIAN UNICORN

From Ambroise Paré's *Discourse, à savoir, de la mumie, de la Licorn*, 1582. The mythical animal shown here has two horns in spite of the fact that its name signifies only one; there is ample precedent, however, for this anomaly; the two-horned animal called *reem* in Hebrew is rendered as unicorn in the translation of the Bible (Deut. xxxiii: 17). Unicorn horn, so called, but probably derived from the elephant, rhinoceros, or the narwhal, was highly esteemed in court circles of Europe in the 15th and 16th centuries as a remedy against both disease and poisoning. Paré denounced it as worthless, but was attacked by M. Grangier, Dean of the School of Medicine, who advanced against him the naïve argument that there was treasured at St. Denis a unicorn's horn for which the King had refused one hundred thousand crowns, and this fact of itself was sufficient proof of its usefulness, for why would the king so value it if it were not useful!

in it, and observing what would happen. The king, to be doubly safe, carried a valuable bezoar stone, so that if it happened that the horn was not working he could cure the poisoning anyway.

The king's surgeon was Ambroise Paré, a man of keen perception and intellect. He told the king that he doubted the virtues of the bezoar stone. The king defended his belief in his possession. Paré then suggested a practical test of the stone—the sort of test that would at once occur to the mind of any modern physician, but which was in Paré's day a great innovation. It was this: poison some one and then give him the stone. If he lived, the stone deserved its reputation; if he died, then the story of the stone was merely a myth. The king consented to this attempt as a sporting proposition.

Today for such an experiment one would naturally turn to an animal such as a guinea-pig or a dog about to be poisoned in the city pound or at the Humane Society, but that humane way of finding out the facts of medicine was not yet in use, and so a man was chosen for the subject. In the royal prison there was a poor cook who had stolen two silver dishes from his master and who, in accordance with the pitiless laws of the period, had been condemned to be strangled to death on the morrow. The king made a proposition to him. He would be given poison and the bezoar stone. If he died, he would be no worse off than if the law took its course. If he survived he would receive his freedom. The cook, who had heard of the miraculous powers of the king's bezoar stone, immediately accepted what seemed to him the chance for certain liberty. The poison was administered. An hour later Paré was called. He found the man seriously ill and gave him the bezoar stone to swallow. The cook in his agony screamed that he would have been much better off if he had been hanged. Seven hours later he died. The bezoar stone was recovered and given back to the king.

That was a perfectly straightforward and conclusive experiment proving that the bezoar stone was not an antidote. But superstition makes a man blind to realities. The king, in disgust, threw his stone into the fire. But his faith in bezoars was not shaken in the least. He said that the stone must have been a counterfeit and that he had been cheated when he bought it. He immediately ordered the purchase of a new one.

CHAPTER SIX

EVERY MAN QUACKS HIS SALVE



THE famous Italian nobleman of the sixteenth century, Alfonso d'Este, Duke of Ferrara, so the story goes, one day fell to speculating as to what trade or profession was most common. His jester, Gonelle, said that medicine had the largest number of professors and offered to prove his assertion. The next morning Gonelle left his quarters, with his head swathed in a bandage.

The first man he met asked him what was wrong. He answered, "I have a terrible toothache." "Ah, my friend," said the other, "I know the best treatment for that; do so and so and you will be cured." Gonelle wrote his name on his tablet, pretending to make a note of the treatment. Every one he met on the street offered him some cure or other, each different from all the others, but declared to have been thoroughly tried and to be infallible.

When he reached the courtyard of the palace, the attendants surrounded him, each one eager to offer advice. Finally he entered the duke's chambers. His Excellency at once called out, "What is the trouble, Gonelle?" The jester replied that he had a toothache; whereupon the duke said: "I know something that will stop the pain. Do this and that and at once you will be cured." Gonelle threw off his bandage and exclaimed: "You, too, my lord, are a doctor. I have on my way hither, although I have passed only one street, found more than two hundred others. Every one in town thinks he is a physician. Can you find more people practicing any other profession?"

There is much truth in this story. In reality, almost every man is a potential quack. A quack is one who pretends to medical knowledge. The word probably comes from the word "quacksalver," one

who exploits his salve; that is, quacks his remedies. Now, in making the broad statement that nearly every one is a quack, I mean merely that most people believe that, without special training, they are qualified to pass judgment on matters dealing with health and disease. For the average man—and woman also—draws illogical conclusions from personal observations, or else he believes what he hears or reads without being able to judge the validity of his



THE QUACK WITH A BEAM IN HIS EYE ATTEMPTS TO REMOVE THE MOTE FROM THE EYE OF HIS PATIENT

information. He is not a trained and critical observer in matters pertaining to medicine. Now I say this without meaning to impute any lack of intelligence. On the contrary, even the most intelligent and successful men often have very erroneous ideas of health and disease, but nevertheless they state their medical opinions and beliefs freely and positively. It takes years of study and intensive application to make a man a trained observer in even one branch of human learning. Moreover, critical ability acquired in one field does not give assurance of equal ability in any other field. It follows then even though a man has excellent judgment in matters



DR. GALL AND LOUIS PHILIPPE

Dr. Franz Joseph Gall in the early years of the nineteenth century introduced the idea that functions of the brain can be localized; that is, one part controls motion of the hands, another that of the feet, and so on—an accepted part of psychology today. But Dr. Gall went beyond the lengths of experimental evidence and concluded that there was a special and recognizable locality for each intellectual and emotional quality—ambition, perseverance, love, and so on. Further, following his false conclusions, he taught that the strength of character was dependent upon the size of the corresponding areas in the brain, and this in turn was indicated by protuberances on the surface of the skull. He and his pupil, Spruzheim, founded phrenology, reading the character from the shape of the skull. Dr. Gall was ridiculed out of Vienna, but in Berlin medals were struck in his honor; he attained riches in Paris. His system of character-reading at first interested educated men and women, but its fallacies soon became evident, and it gravitated into the hands of charlatans, who still exploit phrenology along with its kindred but even less logical fallacy, palmistry.

In the caricature shown here Dr. Gall is staring in consternation at the bumps on the head of Louis Philippe, rising as they do in the areas of "philoprogenitiveness" and "self-esteem," to use Dr. Gall's terminology.

of business, his opinion is not necessarily good in matters of medicine; conversely, a skilled physician may exhibit poor judgment in matters of business.

If you doubt my statement that most people are potential quacks, just start a medical discussion at any gathering you may attend. The result today will be the same as that which Gonelle found in Ferrara four hundred years ago.

For just a moment now, let us carry on an imaginary medical discussion. You are at an informal supper party after the theater. Quite logically the conversation drifts to a discussion of the indigestibility of midnight meals. The man on your right takes over the conversation. Gravely he expounds on the subject of food incompatibilities. Lobster and milk at the same meal, he affirms, invariably lead to severe indigestion; it is a mixture always avoided by him. After delivering this profound dictum he lapses into silence while he eats the lobster à la Newburg before him, apparently oblivious to the fact that this dish is a mixture of lobster and milk.

The man on your left takes up the conversation with the statement that the cause of most indigestion lies in the pernicious habit of drinking water during meals. Every one in the circle nods agreement, apparently blind to the fact that the exponent of this dietetic superstition is consuming his second glass of iced tea.

A lady across the table has heard somewhere the absurd dietetic fallacy that carbohydrates and proteins should not be eaten at the same meal. She has no more knowledge of the physiology of digestion than have the exploiters of this bit of buncombe, but she believes what she hears. Protein, she knows, is in meat, and she is wondering whether lobster falls into that category. To play safe, she sticks to her carbohydrates, munching her bread, happy in her ignorance of the fact that this "staff of life" contains nearly half as much protein by weight as does meat.

Few people, indeed, use their eyes and their ears at the same time except in the one particular branch of endeavor to which they have devoted their lives. Nevertheless, most people assume that they are competent to exercise medical judgment; they naturally assume also that others possess this same ability. A lady, sitting at the supper table where lobster and milk and water are being condemned

and consumed, turns the conversation to her favorite health adviser. He quacks his salves; that is, he advertises his medical attainments. According to the lady who is telling of his virtues, this man maintains that all disease comes from some simple derangement in the body. Since all disease has the same cause, diagnosis is unnecessary. Treatment is all that he is concerned with. One treatment for all disease.

Every one at the table is anxious to believe these statements. They have to accept some one's opinion in matters of medicine. Every man can't devote ten years of his life to the study of medicine and become a trained observer in that field of endeavor. The quack tells them what they want to believe—that there is a simple, universal cure for disease. That is a delusion that flourishes on human hope. But what they don't know about the quack is this: he is, like the medical amateurs at the supper table, merely exploiting his uncritical medical beliefs. He differs from the others in that he is exploiting them for gain.

If this quack were a trained observer, the first thing he would observe is that he has no valid medical knowledge. No insurance company will accept his opinion, for insurance companies deal in facts. No city hospital will give him a place on its staff. The army and navy exclude him from their medical corps. But the quack complains that his exclusion is due to the "medical trust"—and how truly it is. The great majority of our intelligent people put their trust absolutely and solely in the trained and legitimate physician. The quack explains that the reason why his methods are not used by reputable physicians lies in the fact that physicians and dentists refuse to accept any ideas that originate among outsiders. That is not true. To cite just one of the many instances to the contrary: Pasteur, who gave us the conception of germs as the cause of infectious diseases, who laid the foundation for the use of vaccines, and who originated the prophylactic treatment against hydrophobia or rabies, was not a physician; he was a chemist.

One aspect of quackery is very striking to anyone who has followed medical history. Every form of quackery that exists today is purely and simply a revival of some unscientific and discarded medical practice of bygone days. Quackery is merely sixteenth-century

The Famous Water of TALK and PEARL,
Being the Clearest of all Waters, and is of that
 Excellent Quality for Beautifying the Face, that
 in a short time it will turn the Brownest Complexion
 to a Lovely White; It takes away Freckles, Scurf
 and Morphea, makes the Skin smooth and soft, Illu-
 strates Beauty to Admiration.
 Many Perishous Faces are Wrinkled, or damaged by
 using poisonous Powders, this Water will not only
 bring them to their former Complexion, but create
 Beauty.
 Also an Excellent Ointment, that takes away the
 Redness of the Face, if it were Rubies or never so bad,
 in ten times using.
 Also a Water that softens Hair that is falling, and
 makes it grow very thick.
 And an Excellent Ointment that takes away the
 Hair from any part, that it shall never grow again.
 Also a Water that will turn the Reddest Hair to a
 perfect dark Brown.
 Likewise you may have White and Red, or any
 other things to adorn the Face, as *Talk* lively prepared,
 which is a rare thing for the Skin.
 A Salve for the Lips, that gives them a good Colour, and
 makes them smooth, as *Pomades* and Fore-head pieces, Pow-
 ders for the Teeth, with several other things for the adorning
 of Beauty, never the like prepared in England.
*See it is sold at the Blue Ball in New-Ball Court in the
 Square, Anbury Court, Fleetstreet*

TALK

HANDBILL OF A SEVENTEENTH-CENTURY BEAUTY SPECIALIST

The amazing virtues of talcum powder are extolled, "a rare thing for the skin." The condition called "morpheew" is the skin disease, morphea, in which irregular colored patches appear. The mention of the damage from poisonous face powder is not without grounds, for then and even much later white lead and other harmful mineral salts were sometimes used in face powders. Importation of cosmetics into England commenced with the Crusades; toilet articles used in the harems of the East were brought back by the returning Crusaders. The practice of using cosmetics extended widely; in court both sexes used them, and at the time of Elizabeth baths of wine or milk were not uncommon. These luxuries were discarded with the advent of the Commonwealth, but with the restoration of Charles II their popularity returned with renewed vigor. It is probable that cosmetics were used then much more extensively among all classes than they are today. Even in bygone days there were ardent reformers in the field, for a bill introduced into the English Parliament in 1770 contains the following provision: "All women of whatever age, rank, profession, or degree, whether virgins, maids, or widows, that shall, from and after such Act, impose upon, seduce, and betray into matrimony, any of His Majesty's subjects, by scents, paints, cosmetic washes, artificial teeth, fake hair, Spanish wool, iron stays, hoops, high heeled shoes, bolstered hips, shall incur the penalty of the law in force against witchcraft and like misdemeanors and that marriage, upon conviction, shall stand null and void."

medicine revived in the twentieth century. The essential of all quackery, whatever form it takes, is its effect on the imagination of the patient.

The workings of the imagination have no effect on the progress of such diseases as cancer, heart trouble, tuberculosis, and other of the infectious diseases which may cause disablement and death. But the imaginary diseases may respond to the ministrations of a quack. And there are an amazing number of people who have imaginary illness. Their trouble may arise from worry, fear, or maladjustment to their surroundings. They have what I call peace-time shell-shock.

All of the conflicts of the world are not on the battlefield; they are in the home, the school, the office, and the factory. The work-

These are to certify, that I John Freeland, of Thames-Ditto, had been for eleven Weeks ill with the Cholick, a bad Digestion, and reaching to Vomit, for which I used the Medicines of several Physicians, and have taken two Pounds of Quicksilver; but all proving to be to no Purpose, and having been three Weeks without going to Stool. I at last apply'd myself to Mr. JOHN MOORE, Apothecary, at the Bible and Mortar in Abchurch-Lane near Lombard-Street, who in a short Time, by the Use of his Medicines, has entirely freed me from my reaching to Vomit; and in other Respects, I am so well amended, that the Day I subscrib'd this, I walk'd from Wotton to Wandsworth and have no Reason but to hope for a perfect Cure in a Week or two more.

May 29. 1724.

JOHN FREELAND.

ADVERTISEMENT OF AN EIGHTEENTH-CENTURY APOTHECARY

From the *British Journal*, 1724. Note the heroic home remedy for obstinate constipation, the drinking of two pounds of mercury.

ings of the mind may lead to the unconscious counterfeiting of the symptoms of almost any of the physical diseases. Some of these imaginary diseases are so definite in character that they are named specifically. Thus there is a rather rare one, called pseudohydrophobia or pseudorabies. True hydrophobia is a disease which is acquired by infection with the virus found in the saliva of a rabid animal—the mad dog. When the disease develops, it is invariably fatal, although it can usually be prevented by proper treatment. In some persons fear of the disease is very great. If they are bitten by an animal, their imaginations may be so active that they develop the symptoms of rabies without having the disease. They may even exaggerate the symptoms; they may go into a frenzy, barking and snapping like a dog, even though such symptoms do not appear in true rabies. No physician can cure rabies; any quack can cure pseudo-

rabies by any treatment he prescribes; he must merely gain the confidence of the patient and convince him that he is cured.

The quacks make their successes with imaginary diseases. The sufferer from such a disease has, let us say, a pain in his back, not sufficient in itself to incapacitate him, but enough to give rise in his mind to the belief that he has kidney disease; he has heard from some one that such a pain is a symptom of this disease. He goes to a physician, who makes a careful examination. No evidence of kidney disease is found. The physician tells him that even the gravest kidney diseases rarely cause pain in the back and that there is nothing the matter with him except possibly a strained muscle. If the patient has confidence in the physician, his mind is relieved; he gives up his idea of kidney disease and accepts treatment for the sore muscle. But more often he retains his delusion, scorns the suggestion that he consult an orthopedic surgeon or, in lieu of that, a specialist in mental diseases. He seeks aid elsewhere. His conviction in his disease is increased rather than decreased when he consults other physicians and finds none to agree with him. Finally he falls into the hands of a quack who with magnificent assurance confirms the belief in the disease, indeed tells him that it is worse than he had suspected. Having found some one who agrees with him, confidence is thus inspired. Any form of treatment that the quack may happen to use will effect a cure of the non-existing kidney disease.

The tragedies of quackery, however, work in another direction. The man who is cured of his imaginary complaint extols the virtues of the quack. He is so deeply impressed that when his wife develops a cancer, he sends her to the quack for treatment. The mumbo-jumbo of quackery does not heal this kind of disease. The husband waits with optimism as the cancer progresses without interference into the inoperable and hopeless stage, and he then watches her waste away to death.

No one can afford to take such risks as these. And so the question arises, how is anyone going to avoid falling into the hands of a quack? Or let us put it more specifically. You have moved to a new town. How are you going to become acquainted with a reputable and desirable physician in whom you will have confidence and

whose opinion you will respect? Are you going to let the matter rest and depend on chance when an emergency arises, or are you going to be prepared for the emergency?

Imagine yourself with a sudden sickness in the family late at night. You can picture yourself nervously thumbing through the telephone directory in search of a physician, among names that are meaningless to you. Your sudden choice may be the best and most reputable physician in the town, or it may fall upon a blatant quack.

preserves the Teeth and Gums from all manner of Foulness, Corruption, and Puffation, and may be depended upon to answer the Character here given of it, literally and in every respect. To be had only by the Author's Appointment of the Gentlewomen at the Two Blue Posts in Haydon-Yard in the Minorities, at 3 s. 6 d. a Bottle, with Directions.

No. 63. A Gentlewoman of good Repute, who being with Child, was for a long Time afflicted with a violent Head-Ach, for which she could obtain no Cure, till she applied herself to JOHN-MOORE, Apothecary, at the Pestle and Mortar in Abchurch-Lane, near Lombard-Street, who, by bleeding her in the Nostrils, soon eas'd and cur'd her of her tedious and violent Pain; as she is ready to satisfy any Person that shall enquire of her, being directed by the said Mr. Moore.

Loss of MEMORY, or FORGETFULNESS most certainly cured,

By excellent Chymical Drops, peculiarly adapted for that End: They strike at the prime Cause (which few apprehend) of Forgetfulness; make the Head clear and easy, the Spirits free, active, and undisturb'd; corroborate and revive all the noble Faculties of the Soul, such as Thought, Judgment, Apprehension, Reason, and Memory; which last, in particular, they to exceedingly strengthen, as to render

AN APOTHECARY WHO CURED HEADACHE

A continuation of the advertisements of Mr. John Moor appearing in the *British Journal* of 1724. The apothecaries not only dispensed medicaments, but also practiced both medicine and surgery. They likewise advertised freely.

Even if you obtain the reputable physician, he is a stranger to you and you to him—a great disadvantage to both.

There is one procedure by which this uncertainty can be avoided. Pick out a physician in time of health. Ask him to give you and each member of your family a thorough physical examination. Such an examination includes in its barest essentials the percussion and auscultation of the lungs and heart, the recording of the blood pressure, the inspection of the throat, the chemical analysis of the urinary secretion, finally an X-ray examination of the chest, without which a health audit is incomplete. It would be better if it con-

tained a similar examination of the stomach and intestines. It includes also a report from your dentist concerning the condition of your mouth.

A quack does not give a health audit of this kind; the reputable physician does. By means of it he detects incipient diseases; a yearly repetition of the examination may mean to you and your family




A CORDIAL for LOW-SPIRITS

A QUACK HARANGUING THE CROWD


This is said to represent the famous "Dr. Rock" of the eighteenth century, who had an outdoor booth in the neighborhood of St. Paul's Cathedral, London. He was the prototype of successful street-corner venders.

freedom from prolonged and serious sickness, with all of the unpleasant consequences, in both cost and worry, which accompany it. Moreover, the examination is positive and definite; the assurance of existing health it affords goes far to obviate the occurrence of the imaginary illnesses that afflict so many people. And finally, the records of your physical state which the physician keeps are of inestimable value when emergencies arise.

Quackery has the same relation to legitimate medicine that wild-cat speculation has to reputable investment banking. Quackery in



Good News to the Sick.

 Veragaint *Ludgate Church*, within *Black-Fryers Gate-way*, at *Lilies-Head*, Liveth your old Friend *Dr. Case*, who faithfully Cures the *Grand P—*, with all its Symptoms, very Cheap, Private, and without the least Hindrance of Business. Note, He hath been a Physician 33 Years, and gives Advice in any Distem *per gratis*.

All ye that are of *Venus Race*,
Apply your selves to *Dr. Case*;
Who, with a Box or two of **PILLS**,
Will soon remove your painfull **ILLS**.

A HANDBILL ISSUED BY "DR. CASE," A FAMOUS QUACK
OF THE SEVENTEENTH CENTURY

Case as a young man attempted a literary career in London, but without success. He then turned his talents to medical quackery and succeeded famously. He realized fully the value of advertising in the exploitation of quackery, and in this direction his literary ability aided him enormously. Addison declared in *The Tatler* that "Case made more money by his couplets than Dryden made by all his poetical works put together." The most famous of these couplets was the one over the door of his office:

"Within this place
Lives Doctor Case."

both medicine and business has many unfortunate victims. A story is told of a famous quack of the eighteenth century. His name was Rock, and he sold a cure-all remedy from an open-air booth near

Saint Paul's Cathedral, London. He succeeded famously. One day an old friend of his chanced to pass, and after mutual greetings the two went to a near-by inn to pledge their friendship. The visitor, with the charming frankness of childhood friends, concluded a statement of his surprise at the quack's success in these words: "Thee knowest thee never had no more brains than a pumpkin." Instead of becoming indignant, the quack took him to the window and bade him count the passers-by. When twenty had passed, he asked his visitor, "How many wise men do you suppose were among that twenty?" "Mayhaps one," was the reply. "Well," returned the quack, "all the rest will come to me."

Part Three

THE HUMANITARIANS

CHAPTER SEVEN

THE LADY WITH THE LAMP



ON A morning in 1889, a battalion of French soldiers drew to rigid attention. Before them stood a general and a Sister of Charity. She was Sister Maria Theresa. Here are the words of the general:

Sister Maria Theresa, you were only twenty years of age when you first gave your services to the wounded at Balaklava, and you were wounded in the execution of your duty. You were again wounded at Magenta. You bravely nursed the wounded through all our wars in Syria, China, and Mexico. You were carried off the field at Worth, and before you recovered from your injuries you were again performing your duties. When a grenade fell into your ambulance, you without hesitation took it in your hands and carried it to a distance of a hundred yards, when it exploded, wounding you severely. No soldier has ever performed his duty more heroically than you have done, or lived more successfully for his comrades and his country. I have the honor to present you, in the name of France and the French army, with the cross which is conferred only on those who have shown remarkable bravery in action. Soldiers—present arms!

Twenty-six years later, 1915, at Waterloo Place, London, there was unveiled a new statuary group, a memorial to the Crimean War. One of the figures in that heroic group was of a woman—a nurse. It was the “lady with the lamp”—Florence Nightingale. Except for monuments to ladies of the royal family, this was the first public statue to a woman in London.

These women, Sister Maria Theresa and Florence Nightingale, each typify an aspect of a great humanitarian calling. One expresses nursing as a charity; the other, a profession. Sister Maria Theresa followed in a course as ancient as her church—a life devoted to charity in the care of the sick and injured. She was only one with

the many thousands who came before her and who followed after her, and whose heroism and devotion to duty were as great as hers.

Florence Nightingale did not found nursing, for nursing is one of the oldest occupations of women. What Florence Nightingale did was to make nursing a dignified secular profession and a branch of medicine. She instituted also the modern methods of training nurses.

The success of Florence Nightingale came as the culmination of a series of seemingly fortuitous events. Each, even to a war, was a

we are told of patients lying for hours, and even days, and making desperate attempts to catch the surgeon in his flying visits from ward to ward. This great deficiency, great as it is, can scarcely be called the greatest. There are no nurses at Scutari; at least, none for the English, though the French are attended by some Sisters of Mercy from a neighbouring convent. But what is almost incredible, but nevertheless true, there is not even linen and lint to bind wounds. It certainly reflects great disgrace somewhere or other, that a material as necessary to the cure of wounds as a hospital itself should have been forgotten, and that, while the Turkish Government has provided a palace for the reception of the wounded, the British Government has not even found linen to bandage their wounds. Nor is this all. The fever patients and the wounded suffer a dreadful thirst, for which cooling draughts are necessary. The Government that has omitted nurses and bandages from the requirements of the wounded is not likely to have treated them to luxuries. Indeed, at this moment the four thousand inmates of the hospitals at Scutari and Therapia have none but what they can obtain by private friendship or precarious benevolence.

NEWS OF THE HORRORS OF SCUTARI

Extract from the *London Times* of 1854. Reports of the frightful neglect of the English wounded during the Crimean War published in the *Times* were in a measure responsible for the movement to supply proper nursing facilities. Florence Nightingale undertook the work. Through her efforts the training of nurses was instituted, and her example of devotion at Scutari popularized the movement.

necessary step in her career and was timed precisely to the moment of need. The first of these events—if it can be called such—was the condition of nursing in hospitals, particularly in those of England, in the first half of the nineteenth century. This period was one in which all social relations were marked by extreme prudery—so much so, in fact, that this attitude had affected even the Sisters of Charity. A series of absurd restrictions were imposed upon them by their religious orders. They were forbidden to perform all sorts of necessary practical bits of nursing on the grounds of impropriety.



QUEEN MARY TOUCHING A SCROFULOUS BOY
From Queen Mary's Manual

Consequently, while they retained their serenity and gentleness, they had lost their practical usefulness. The Sisters watched the sick, maintained discipline and system in the hospital, and shed an atmosphere of refinement over the wards. All the actual care of the sick was performed by lay attendants.

In most English hospitals even this supervision by gentlewomen was lacking, and the entire nursing was in the hands of lay attendants controlled by men. The consequence was that nursing in the hospital, and in the home, as well, was relegated to the lowest type of vulgar, brutal, drunken women, of which Dickens has given us a picture in his description of Sairey Gamp.

A note in the *London Times* for April 15, 1857, describes the servant nurses of the large hospitals in these words: "They were sworn at by surgeons, bullied by dressers, grumbled at and abused by patients, insulted if old and ill-favored, talked flippantly to if middle-aged and good-humored, and tempted and seduced if young and well-looking."

In short they were the worst type of women conceivable for the work of nursing. The hospitals under their care were filthy and vermin ridden, and the wards were scenes of repulsive squalor. Nor did the physicians in charge pay much attention to any need for cleanliness. Here is an extract from the regulations of one of these hospitals; it is in reference to the linen of the patients. It says: "Their sheets shall be shifted once a fortnight; their shirts once in four days; their nightcaps, drawers, and stockings once a week." The windows of the hospital were kept tightly closed against fresh air. The wards were inconceivably horrible.

Now turn from these events to those in the life of a well-born and educated English lady, young Miss Nightingale. She has been pictured as a saintly, self-sacrificing, delicate woman who threw aside a life of pleasure to help the afflicted. But this picture is not a true one. She was a strong-minded, determined woman with a gift of caustic sarcasm. Her one great interest in life was to establish the independence of women. She lived in a period of transition. Women were allowed education and that phase was new, but they might not yet display their talents in any practical use. Following their education they sat about the house in genteel boredom, poured

tea, and waited for the equal boredom of a Victorian marriage. Here are the words in which Miss Nightingale sums up the situation. She says:

The want of necessary occupation among English girls must have struck everyone. . . . The intellectual development of English women has made extraordinary progress. But the human being does not move two feet at once, except he jumps; while the intellectual foot has made a step in advance, the practical foot has remained behind. Woman stands askew. Her education for action has not kept pace with her education for achievement.

Her family suggested that if she were bored she might visit the sick in their homes and bring comfort to them. She replied that she

*I am myself always a
prisoner from illness &
overwork. but all this
I owe to my fondness
Florence Nightingale*

A NOTE IN THE HANDWRITING OF FLORENCE NIGHTINGALE

did not know how to tend the sick and that all she could do would be to gossip with them, and she could as advantageously gossip with her friends. She then horrified her family by suggesting that she be allowed to go to a hospital and learn nursing. In view of the conditions in the hospitals her family's horror had some justification. They compromised on a trip to the Continent, and so with her sister and mother she went to a fashionable watering-place. But she stole away from there and entered on a short course of training with the Sisters of St. Vincent de Paul at Paris.

Florence was now twenty-nine, and had passed into that stage of spinsterhood which was the despair of the Victorian family. Such a one would most likely go on caring for the china and decorously pouring tea the rest of her life. But she had other ideas. She journeyed to Kaiserswerth, a town near Düsseldorf, where a Lutheran

pastor named Fliedner had started a training-school for discharged female prisoners. In his efforts to find occupation for these women he had evolved the idea of training them to be nurses, and to this end he was operating a small hospital. Florence Nightingale joined his classes. Her experience there gave her the solution to her problem—a field of work for educated women. She planned to elevate nursing to a dignified profession. So she returned to England and, her family now having given her up in despair, became the superintendent of a nursing home in Harley Street, London. But other gentlewomen did not respond to her example; she made little progress in her endeavors to interest them in nursing.

We shall turn now to events occurring at this time in Russia and Turkey. Nicholas I of Russia had decided to renew the plans of Turkish conquest commenced by Catherine the Great. Assured of the neutrality of Austria and Prussia, he moved his troops into the principalities of the Danube.

In the same year that Florence Nightingale assumed the superintendency of the nursing home, the French and English fleets took up a position at the entrance of the Dardanelles for observation. A year later these western powers had allied themselves with Turkey, declared war on Russia, and the Crimean War was under way. Our interest here does not take us to the battle-fields of Alma or with the historic charge of the Light Brigade at Balaklava. Instead we shall leave the allied armies besieging Sevastopol and return again to London.

News of the war came to the *Times* from Russell, the correspondent at the front. In September and October of 1854, before military officials at the front had suppressed him, he told some plain and unpleasant truths; he wrote, among other things:

It is with feeling of surprise and anger that the public will learn that no sufficient preparations have been made for the wounded. . . . There are no dressers or nurses. The French medical arrangements are extremely good . . . they have the help of the Sisters of Charity. We have nothing. The men must attend to each other or receive no relief at all. The sick appear to be attended by the sick, and the dying by the dying.

In consequence of this exposure the English public was aroused to the highest indignation. A call was issued for volunteer nurses.

Women responded, but they were untrained; they knew nothing of nursing. There was no corps of trained nurses in England to answer the call. But there was Florence Nightingale, who was ideally suited to fulfill the needs of the moment. Mr. Sidney Herbert of the War Office broke all red tape and wrote her, offering to give her full charge of the situation.

One week later Florence Nightingale had collected thirty-eight nurses, ten of whom were nuns. She was then officially designated, "Superintendent of the Nursing Staff in the East." The thirty-eight nurses were to take care of all the wounded from the entire British army.

The little band landed at the hospital at Scutari, a suburb of Constantinople, on November 4, 1854. This hospital was a Turkish barrack intended to house a thousand men; in it were crowded four thousand soldiers who were wounded or overcome with cholera. Four miles of beds and thirty-eight nurses! The wounded and the sick were brought in ships across the Black Sea. They received virtually no medical attention before or during their voyage, and they spent two weeks on the way.

Army regulations required that these men bring clothing and equipment with them, but they had only the rags they wore. The regulations made no provisions for supplying them. Consequently they were tumbled into the hospital to lie where they fell, and to die there.

There was no furniture in the hospital except beds supported on trestles. The windows were closed. An open sewer ran under the floor, and that floor itself was too rotten to scrub. The sheets were pieces of canvas. There were no towels, or basins, no knives or forks, no medicines—and no place to serve as a laundry.

In the yard of that hospital there were piles of unopened boxes containing supplies, the very necessities from the want of which the men were suffering and dying. But army regulations forbade the opening of these boxes until the orders to do so had arrived from proper authorities.

But Florence Nightingale was not the woman to wait upon military red tape while her patients suffered. She opened the boxes;

she cleaned and aired the hospital; she built a laundry. She even built a new hospital.

No frail and timid woman achieves such aggressive triumphs as these. Florence Nightingale was an angel of mercy to the wounded soldiers. They kissed her shadow as it crossed their beds. At night, as, lamp in hand, she went through the wards, a whispered blessing sounded after her. But she was no angel of mercy in the eyes of the local military authorities! She was a raging, tormenting demon. They cursed her very presence. In the interest of her patients she bullied the colonel; she cut short the cherished red tape of the army. She appealed over the heads of local authorities to the War Office at London. Each time she wrote, her appeal was granted and her authority was strengthened. When money was lacking for supplies and proper food, for sheets and lemons, shirts and tea, she wrote to London concerning her needs, and money flowed out to her from popular subscription. She triumphed over petty official oppression; no effort or personal sacrifice was too great to make in the interest of nursing. Her work, as she defined it, was "to help the patient to live," and every means to that end she justified.

In 1856 the war ended. The troops were demobilized. Four months later, when the last of the barrack hospitals had been closed, Florence Nightingale returned to England.

No effort of hers was needed now to establish trained nursing; it was inevitable. She had done her work. Thousands upon thousands of advocates of trained nursing preceded her to England. Nowhere could more appealing champions have been found, for they were the wounded heroes of the war. Sisters, mothers, daughters, and wives heard of the work of the "lady with the lamp"; to her and her nurses they owed the lives of their brothers, fathers, sons, and husbands. Funds were raised and training-schools for nurses established, and soon the new-style nurses were in the wards of the hospitals. A new era in the care of the sick had commenced. But Florence Nightingale, in giving the example of devotion that brought this era into being, had also given her health. Thereafter and until her death in 1910 she was an invalid.

CHAPTER EIGHT

UN SOUVENIR DE SOLFÉRINO



HAT an everlasting picture there is left of Florence Nightingale, the lady with the lamp. Before her coming to Scutari, from sundown to daybreak the doors of the barrack hospital were closed; the wretched victims of war were left alone in darkness, unattended, their dead of the night to be carried out with the morning light. Then through the wards came Florence Nightingale, her lamp throwing a halo of light about her. A wounded soldier's hand is extended for the cup of water that she holds to him, a smile of child-like peace comes to the face of the boy whose brow she touches with her gentle fingers, and a grizzled veteran turns on his rough couch to kiss her shadow as it falls across the straw.

You remember the lines to her in Longfellow's poem, "St. Filomena":

On England's annals, through the long
Hereafter of her speech and song,
That light its rays shall cast
From portals of the past.
A lady with a lamp shall stand
In the great history of the land,
A noble type of good,
Heroic womanhood.

And out of Florence Nightingale's work at the barrack hospital there grew a great and practical humane institution—the training of nurses, nurses to help the sick to live. But her lamp lit the light of an even broader humanity. Its flame struck a responsive fire in a great Swiss humanitarian, Henry Dunant. He expanded her work of mercy to the broadest extent that men have ever attained. He

made each one of us a nobler man or woman; he inculcated into our lives a spirit of gentle mercy.

Let us turn to him, Henry Dunant, a man little known in the annals of written history, but rightfully deserving of a place beside the greatest men of all times. We see him first in the year 1859;



FIRST AID TO A WOUNDED KNIGHT

From a manuscript of *Lancelot of the Lake*. The wounded man is being carried to a monastery for extreme unction.

he is a young man, a tourist. He stands watching the great battles of Magenta and Solférino. His mind is tortured by the scenes of grim destruction, his soul stirred with the ideal that Florence Nightingale has set, and already there forms in his consciousness the great idea that he is to give to the world. He sees the allied armies of

France and Italy under Napoleon III meet the army of Austria under Francis Joseph. Forty thousand killed and wounded is the harvest of Solférino. There is no treaty to protect the medical services of armies. That of the defeated Austrians of necessity retreated with their forces, leaving the wounded unattended on the field. The French and Italian surgeons followed on with the pursuing allies. Their wounded lay with the Austrians, first scorched with the intolerable heat of the summer sun and then chilled with rain and the cold of night. For days they lay unattended.

And what did the tourist, Henry Dunant, do? He gave his aid to the wounded as far as he was able, and he wrote a book, a pamphlet called *Un Souvenir de Solférino*, seemingly just another story of war to add to the thousands that already had been written, but in reality one which some day will be cherished as the document which led to one of the greatest contributions to civilization. Hundreds of thousands of men saw the scene that was unfolded before his eyes that day in 1859; countless thousands have seen similar scenes, and worse; but to none of them came the inspiration that was Henry Dunant's.

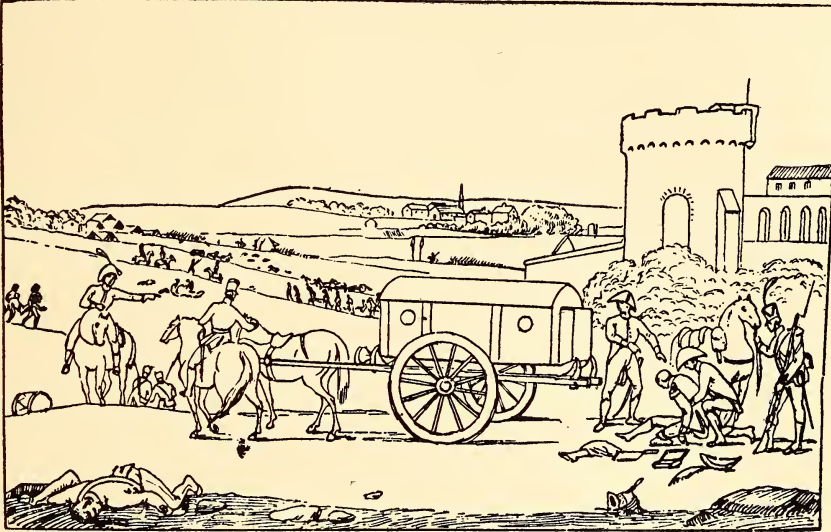
Read his pages; they depict the scenes of battle that others have described even more vividly. Here is one:

The morning of June 24th dawns with the sound of battle. Three hundred thousand men are face to face. Fifteen miles long stretches the battle line. The bugle notes and the call of the drum sound the charge. At three in the morning the allied army corps are marching on Solférino. By six o'clock the fire becomes more furious. In the warm June morning the Austrian troops in compact masses march along the open roads under the fluttering banners of black and red. The brilliant Italian sun glitters on the polished armour of the French dragoons. In the burning midday heat still more furiously the battle rages. Column after column fling themselves one upon the other. Piled high lie the dead on hills and in ravines. Austrians and allies trample the wounded under foot, kill each other, and fall upon their bleeding comrades. The men are drunk or mad with blood; the butchering goes on. Over the field of slaughter dashes the wild cavalry charge, the horses' iron hoofs beating down the wretched men. Back and forth the conflict rages. Villages are taken and retaken; every home, every farm is the scene of battle and of struggle.

Behind dark, threatening clouds, the sun is lost. A tempest of wind and lightning arises; icy rain sweeps across the field. As the shadows of night

begin to fall, the tumult of the battle dies away. The silent darkness is broken by the groans and cries for help of the wounded.

It is the ageless story of battle he tells. Then comes the pitiful aftermath. The dash and patriotic glory of martial conflict is gone now; only the wounded soldier remains, torn and bent, trampled in the mire. History never tells his story. Then comes the rescue work so pitifully unprovided for in bygone days.



LES PREMIÈRES AMBULANCES VOLANTES DE LARREY

DR. LARREY'S "FLYING AMBULANCE"

Dr. Larrey was surgeon-in-chief to the Grand Armée. He took part in sixty battles and four hundred engagements. Napoleon in his will left 100,000 francs to "Larrey, the most virtuous man I have ever known." He enormously improved first-aid work on the battle-field and alone did two hundred amputations in twenty-four hours at Borodino.

Henry Dunant watched the few heavy carts jolting over the bumpy roads, with their tragic burdens; the men who died on the journey were cast out on the roadside. Churches, barracks, convents, and homes were filled with wounded; men for whom there was no room were left in the open streets; no beds, no clothes, no dressings, few surgeons, fewer nurses. Volunteer help, untrained, unprepared, rushed about in a frenzy of impotent excitement; volunteers who treated only their own compatriots.

Henry Dunant witnesses this scene. He walks among the wounded. On the altar steps of a church a man with a shattered jaw motions dumbly for aid, his eyes plead for help; beside him lies an African chasseur, horribly wounded, his clothes in rags, covered with mire. For three days he has had nothing to eat. Dunant bathes his wounds and gives him bouillon; the man lifts his benefactor's hand to his lips. Dunant, with tears in his eyes, turns away to gather together women of the town into a volunteer corps. He leads them among the wounded, making no distinction in his ministrations between the allies and the Austrians. How quickly women rise to a humane idea! Soon his little group of volunteers as they minister to the wounded are repeating his "*tutti fratelli*"—"all are brothers."

Ideas of war have changed through the centuries. Once the conquering hordes killed their vanquished enemies; no quarter was given. Later, the wounded were spared. But was it humane to spare them and make no provision for their relief, leaving them to suffer a lingering death?

"All are brothers"—the wounded are our brothers; their misfortune is a tie that binds them to us, no matter in what cause they may have fought—that was Henry Dunant's cry. National feeling falls away before suffering, leaving us brothers all, was Henry Dunant's inspiration.

In his book he asks a question:

Why have we thought well to recall these scenes of grief and desolation, to recount such lamentable and gruesome details, and to draw such vivid pictures of despair?

And he answers with another question:

Would it not be possible to found and organize in all civilized countries permanent societies of volunteers which in times of war would render succor to the wounded without distinction of nationality?

That was a new ideal of humanity, truly a step toward the brotherhood of men. There had been in the past some few attempts on the battlefield to give truces to the hospitals, but such were rare. The Knights Hospitallers of the Crusades had rendered their aid, and so also had the Catholic Sisters of Mercy. But here was a man suggesting something deeper, more fundamental. He asked that the

wounded, the physician, and the nurse be held as neutrals, and the hospital as sacred territory. He asked all nations to send their help for the wounded. He wanted to organize a great international army transcending for its humane purpose all national ties and prejudices.

Henry Dunant, his mind burning with the noble idea, was no mere theorist. Indefatigably he worked to bring his ideas before the rulers of Europe. In 1863, four years after Solférino, his efforts were rewarded. A meeting was held at Geneva. At this first conference fourteen European countries were represented. Each agreed to adhere to the suggestions he proposed; the wounded man, the physician, and the nurse were to be neutrals, and the hospital a sanctuary. An international army was to be formed; an organization of mercy that would put into practice, efficiently, the humane desires of all who wished to aid those in misfortune, but who, of themselves, had no way of doing so directly. It was to be an organization toward the work of which all might contribute according to their desire, and in so doing know that they had done their part toward saving life, preventing suffering, and relieving misfortune. It was to be the extended helping hand of a world-united people with a conscience quickening to an appreciation of the misfortunes of their fellow men.

Such an international army must have a flag to rally under, a flag respected by all men in war and in peace. The choice of the emblem was made as a tribute to Switzerland and its great citizen, Henry Dunant. It was the Swiss flag with its colors reversed—a red cross on a white ground. The organization that it symbolizes is the International Red Cross.

Our own country was slow in subscribing to this international movement, but not from any lack of humanitarian intentions. Rather it was from a policy of refraining from any European entanglement. We had our own humane organization for war and disaster, the United States Sanitary Commission. But it limited our charity to our own misfortunes. It did not have the wide scope of the International Red Cross, it was not a brotherhood of all men and all nations joined for a common cause. Nearly twenty years went by before the United States sanctioned the Red Cross; in 1882, during the presidency of Mr. Arthur, the treaty was confirmed. The American Red

LES
PRISONNIERS DE GUERRE

RAPPORT

PRÉSENTÉ

AUX CONFÉRENCES INTERNATIONALES

DES

SOCIÉTÉS DE SECOURS AUX BLESSÉS MILITAIRES

DES ARMÉES DE TERRE ET DE MER

PAR

HENRY DUNANT

PARIS

IMPRIMERIE ADMINISTRATIVE DE PAUL DUPONT
RUE DE GRENELLE-SAINT-HONORÉ, 45

1867

AN APPEAL FOR THE HUMANE CARE OF PRISONERS OF WAR

Frontispiece of an address by Henry Dunant. Dunant, a Swiss, inspired by the heroic work of Florence Nightingale during the Crimean War and by his own experience at Magenta and Solferino, suggested the founding of an international and neutral organization to care for the wounded during war. From his idea has grown the International Red Cross. Prior to his time nothing of this kind had existed, although there were isolated instances of mutual agreement to spare the wounded and respect the military hospital. The surgeon, Ambroise Paré, speaks bitterly of the treachery of the Spaniards in breaking their pledge to spare the prisoners at Metz in 1537; he disguised himself as a common soldier to escape paying ransom, and nearly lost his life in consequence of the general slaughter of the prisoners of low rank. At the battle of Dettigen in 1734 the physician, Sir John Pringle, brought about an agreement between the French and English to treat the hospitals as neutral sanctuaries. In this instance the agreement was scrupulously respected.

Dunant's book, *Un Souvenir de Solferino*, was directly responsible for the organization of the International Red Cross; the title page shown here is from a pamphlet dealing with measures for the humane care of prisoners of war and their exchange.

Cross came into being, but in those early days it lacked full support of the federal government. It was a feebly organized association. It did its peace-time work in the Mississippi floods, the yellow-fever outbreaks, the forest fires; and it made its contribution to foreign famines. But it was not the solid, efficient national organization that we know today. Its efforts in the brief Spanish War, well-intended efforts but badly executed, showed the defects of the loosely organized group. Not until 1905 did our Red Cross become truly a national organization. An act of Congress, of that date, signed by President Roosevelt, provided for a permanent central organization whose accounts should be audited by the War Department and submitted to Congress by the Secretary of War. Since that time the President of the United States has been the president of the American Red Cross.

The congressional charter given to the Red Cross expanded the scope of its work to that of the world's greatest humanitarian force, not only in war, but in peace. Here are the words of that charter:

To continue and carry on a system of national and international relief in time of peace and to apply the same in mitigating the suffering caused by pestilence, famine, fire, floods, and other great national calamities and to devise and carry on measures for preventing the same.

I don't need to tell anyone what the American Red Cross has accomplished in its practical humane work. You remember its part in the Mississippi flood of 1927 and in the Japanese earthquake that razed Tokyo and Yokohama in 1923. And who doesn't recall its noble work in the World War? That was a time when 16,000,000 of our citizens joined under its banner, and in 1917 and 1918 contributed \$400,000,000 for its war work.

But pause a moment, you who saw the World War in all its horrors, you who sent sons and husbands to its battlefields. Think how much more ghastly its devastations would have been if the Red Cross treaty had not protected the hospital and the wounded man, if the Red Cross nurse and the ambulance had not been there. Think of the Solférino that Henry Dunant saw; think of the Scutari where Florence Nightingale gave her services.

CHAPTER NINE

THE "SPITTLE HOUSES"



May 12th is the anniversary of Florence Nightingale's birthday. In commemoration of her pioneer work in hospital reform that date is designated National Hospital Day. The hospitals then throw open their doors inviting the public to come as their guests to inspect them. Many thousands of people accept this invitation. They are impressed deeply and favorably by the cleanliness, the orderliness, and the efficiency of these institutions that offer to the sick and injured of our country an unexcelled service.

You will appreciate the modern hospital more if you know something of the conditions from which it arose. The natural tendency is to regard the presence of a hospital as a matter of course and to assume that it was always clean and efficient. Such is not the case. The theoretical principle upon which the hospital is conceived is ancient, but the type of service offered by the hospital of today is of very recent origin.

In order that you may see the hospitals of today in their true light I am going to give a very brief description of some of former times. Let us start with an institution among the Babylonians in the very ancient days which date from about the time that the Egyptians were laying the corner stone for the first pyramid. Herodotus, the Greek historian of twenty-three hundred years ago, tells of the ancient hospital system used, long before his time, in the cities of Babylonia.

He says:

They bring out their sick to the market-place, for they have no physicians; then those who pass by the sick person confer with him about the disease, to discover whether they have themselves been afflicted with the same

disease as the sick person, or have seen others so afflicted; then the passers-by advise him to have recourse to the treatment by which they escaped a similar disease, or which they have known to cure others. And they are not allowed to pass by a sick person in silence, without inquiring the nature of his distemper.



AN OPERATION IN THE HOME

From a surgical work of the sixteenth century. In illustrations of this kind the artists as a rule supplied all of the domestic appurtenances, the young child, indifferent to the fate of his parent, and the rat and the dog, the daughter comforting the mother, the inquisitive neighbor, and the helpful one. The brazier of burning charcoal displayed at the head of the bed is to heat the instruments used in cauterizing the wound and to stop hemorrhage. The second assistant is rolling bandages. The surgeon, intent upon his operation, is trephining the skull of the patient, boring a hole through it to relieve pressure upon the brain, arising probably from a fractured skull. The patient is unanesthetized, but appears to be unconscious from some injury.

It is said that a little part of everything in the past survives today. The Babylonian system is actively in force on the porches of summer hotels.

For our next scene let us follow the historian Herodotus into his native country, ancient Greece. There we find no hospitals in the true sense of the word, but instead magnificent sanatoria. On the

hillsides are great temples of healing; marble buildings with columned passageways, surrounded by shady groves and well-kept gardens watered by springs, and bathed in the sunshine of the Mediterranean. In the main chamber stands a statue of Æsculapius, the god of healing; in his hand is a staff about which twines a snake—the emblem of the physician even to this day. The sufferers who come to these sanatoria make their votive offerings to the god; they



A SIXTEENTH-CENTURY SURGICAL INSTRUMENT

A trephine shown in the works of Giacomo Berengario du Carpi, 1521. The instrument served as a bit to be fitted into a brace, as shown in the previous illustration. Trephining is one of the oldest surgical operations. Skulls dating from prehistoric periods have been found showing the openings made during this operation, some, indeed, with as many as five openings, indicating that the patient survived the operation and lived to have it repeated. These early trephinings were performed with stone knives; the disk of bone removed was cherished as an amulet. It is believed that these early operations were performed in cases of epilepsy, insanity, and headache in order to afford an exit for the evil spirit causing the disturbance. As might be expected, some of the skulls show indications of chronic infection of the bone, resulting from the unclean surgical procedure.

sleep in the temple, and in their dreams Panacea and Hygeia, the daughters of the god, minister to them. The next day the priests of the temple bathe them, prescribe a diet, perhaps give some remedial herbs, and offer them rest in the sunshine and intercession with the god, who is presumed to direct the treatment. These patients are not very ill—if they were, they would not be admitted, for the priests wisely promulgate the belief that it is disrespectful to the god to die in his temple.

Now we leave the Grecian sanatoria, and after a lapse of many years we come into western Europe to see those hospitals from which our own are lineal descendants. In the years between, the Grecian sanatoria have crumbled; piles of fallen marble mark their site. The Christian religion has arisen. Rome has been overrun by the barbarians. The Arabs have taken Egypt and the Holy Land. We are in the Middle Ages of European civilization. These are days of great religious faith, but at the same time of low civilization as judged by worldly standards. Public, domestic, and personal hygiene are at their lowest ebb. The walled cities are crowded and they have no sewers. Filth accumulates in the unpaved streets. The dwelling-houses contain open cesspools, their rush-strewn floors are littered with refuse, and in them is a pestilence of flies and vermin. Never in all history were the people as disease ridden as in these days. Even with prodigious efforts of reproduction the population can make no headway against the inroad of disease. The population of all Europe is less than that of the British Isles alone in the twentieth century. Yet in these Middle Ages there are conceptions of idealistic beauty from which arises the principle of the charity hospital, although the impracticability, the other-worldliness of the time, prevents the inmates from receiving any rational medical care.

The early hospitals of Europe were religious in origin. Under the Christian conception of charity it was a religious duty to provide for the welfare of the weak, the sick, and the destitute. The first important hospital of western Europe was founded at Fabiola about the year 400. Its purpose, in the words of St. Jerome, was "to gather in the sick from the streets and to nurse the wretched sufferers wasted with poverty and disease." This hospital and the many that came after it extended hospitality to the sick.

The name "hospital" comes from the same Latin source as "hospitality." The word was carried into the English language and either in that form or more commonly as "spittle house" was applied to all institutions of refuge; those that cared for the sick and also those that housed the paupers and insane. It is only in recent times that "hospital" has come to signify a place where the sick receive temporary aid and shelter. The word "asylum" has come into use to

distinguish those institutions that provide a more permanent form of shelter.

The hospitals of medieval Europe were dark, crowded, and insanitary buildings into which all classes of the destitute were received without discrimination. The inmates were given food, shelter,

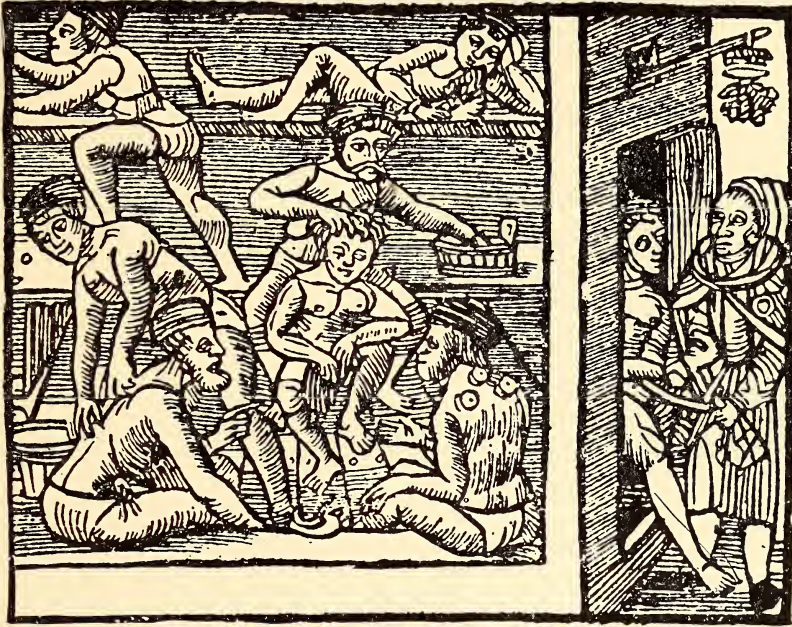


AMPUTATION PERFORMED IN THE HOME

From a surgery of 1592. As in the operation for trephining, the cautery irons are for the control of hemorrhage. The French surgeon Ambroise Paré in the same century introduced the practice of tying the ends of the severed blood vessels with cords, as do surgeons today, instead of burning the flesh. Amputation was a very common operation and continued to be until Lister introduced the antiseptic principle into surgery late in the nineteenth century. The patient shown here is enduring the pain of the operation without anesthesia, as did all patients until the middle of the nineteenth century.

and religious admonition, but no medical treatment. A great hospital of this kind, called a *Hôtel Dieu*, was erected in each of the important cities of France as the result of a movement started in the seventh century by St. Landry, Bishop of Paris. The true spirit of this hospital movement has been defined by Dr. John Billings, himself the designer of many hospitals, in these words: "When the medieval priest established in each great city of France a *Hôtel Dieu*,

a place of God's hospitality, it was in the interest of charity as he understood it, including both the helping of the sick poor and the affording to those who were neither sick nor poor an opportunity and a stimulus to help their fellow men; and doubtless the



A MEDIEVAL HOSPICE

One patient in the hospice shown in this old wood-cut is having his back massaged, another his head washed, and a third his shoulder dry cupped. This practice of cupping is now largely obsolete. The air in a cup-shaped receptacle, in ancient times a horn, is heated by burning a bit of tinder in it; the cup is then inverted and applied to the skin, to which it adheres in consequence of the partial vacuum caused by the cooling of the air. Cupping produced a local reddening of the skin, and if the skin were cut, wet cupping, blood was sucked out.

cause of humanity and religion was advanced more by the effects on the givers than on the receivers."

These great refuges for the sick and poor were crowded to overflowing, for sickness and poverty were vastly more prevalent than they are today. The devastating plague, the Black Death, wiped out whole towns in a single epidemic, and in the intervals between its

onslaughts tuberculosis took a frightful toll. Provision had to be made also for diseases that now, in our country, cause us little or no concern. Leprosy became widely spread as a result of the Holy Crusades. The monasteries of St. Lazarus were set aside as hospitals to care for lepers, and in France alone there were more than two hundred of these institutions.

The hospitals remained under religious control until about the thirteenth century, when by mutual agreement they passed from the hands of the church authorities into those of the municipalities. The care of the destitute sick then became a civic duty. The charitable spirit persisted, but the medical treatment did not improve, nor did the sanitary conditions within the buildings.

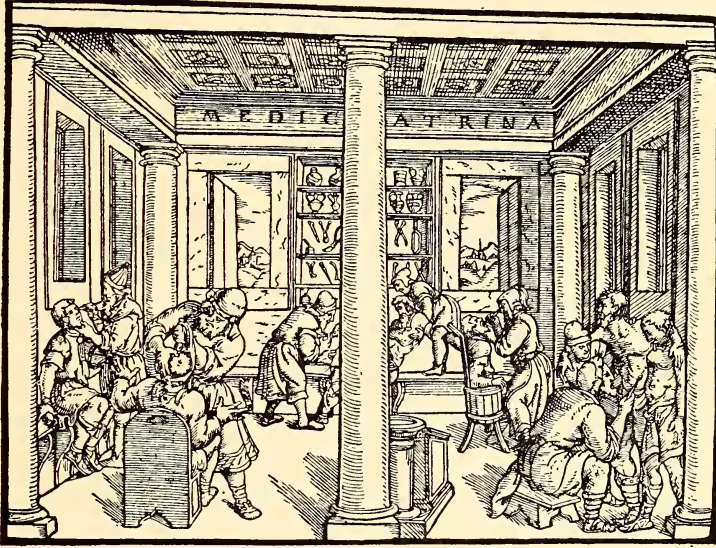
I want to describe something of the conditions in one of these great European hospitals, not as it appeared in the Middle Ages, but as it was in 1788, almost at the beginning of the nineteenth century—very near to our own times. My facts are taken from the report that Jacobus René Tenon made of conditions in the Hôtel Dieu of Paris in that year. His description would be applicable, with little modification, to any hospital of that time. There were in this hospital some twelve hundred beds, each holding from four to six patients. That is a practice that is hard to comprehend today, the putting of half a dozen adults or a dozen to twenty infants into one broad bed. In addition there were about five hundred patients in single beds, and the hallways contained a thousand more lying on heaps of straw. The place was overrun with vermin; the air was so vile that the attendants held sponges soaked in vinegar before their faces. The average mortality, regardless of disease on entry, was one in five, and recovery from a surgical operation was in the nature of a miracle.

Dr. Max Nordau has left a most vivid description of hospital conditions of that time, and he says:

In one bed of moderate width lay four, five, or six sick persons beside each other, the feet of one to the head of another; children beside gray-haired old men; indeed, incredible but true, men and women intermingled together. In the same bed lay individuals affected with infectious diseases beside others only slightly unwell; on the same couch, body against body, a woman groaned in the pangs of labor, a nursing infant writhed in convulsions, a typhus patient burned in the delirium of fever, a consumptive

coughed his hollow cough, and a victim of some disease of the skin tore with furious nails his infernally itching integument. . . .

Remember, this description applies to a hospital of less than a hundred fifty years ago—it could apply also, so far as sanitary conditions are concerned, to a hospital of seventy-five years ago—a time well within the memory of men living today. But that seventy-



A DISPENSARY OF THE SIXTEENTH CENTURY

Dental as well as medical and surgical aid is being administered. This illustration is taken from the title page of a book published in 1550 and consequently presents the artist's conception of the dispensary rather than a representation of any existing institution of the kind.

five years has given us the greatest practical advances ever made in medical science.

The first of these came from the work of Florence Nightingale, the angel of mercy and cleanliness in the hospital. During the Crimean War at the barrack-hospital of Scutari she demonstrated that the sick required fresh air, cleanliness, and the attention of trained attendants. She gave us the modern trained nurse.

Next came the work of Joseph Lister, who in 1867 showed that infection in wounds could be prevented by antiseptics and by clean-

liness. The advent of immaculate cleanliness, which is the supreme virtue of the modern hospital, dates from his time. Soon afterwards there came the demonstration of the bacterial cause of infectious disease; the very foundation of modern preventive medicine.

These discoveries revolutionized medical care. Following them there came new treatments of disease and new methods of diagnosis. The hospital became the center where all of these changes were carried out and where all of the improved methods found their greatest display. Whereas a century ago a roof and four walls with a floor crowded with beds sufficed to make a hospital, now the finest architectural skill is needed to design the building to house the elaborate appurtenances used in the care of the sick and the extensive staff of attendants devoted to their wants. Today less than a quarter of the space within a hospital is given over to beds for the patients.

There has been another change in the hospital quite as distinct and definite as that of the appearance of its wards. It is a social change. I refer to the use of the hospitals by non-charity patients. In the past, when hospitals were in the condition that I have described, no one who could afford to receive medical attention in his home would go to a hospital any more than anyone who could afford otherwise would wish to live in a pauper house. These hospitals of bygone days were essentially barracks into which the destitute were dumped to die or recover as chance dictated. People who could afford to do so had their surgical operations at home in their own parlors, they had their babies in their own bedrooms, and for their serious ailments they were moved into the guest chambers. Now, however, the hospital affords facilities far exceeding any that can be obtained in the home. The surgeon insists that his patient go to the hospital for an operation; household surgery is no longer considered safe surgery. For the benefit of his patient the surgeon demands the presence of a trained staff of assistants and other facilities offered nowhere else than in the hospital, the steam sterilizers, the well-lighted operating room, the laboratories, and the X-ray equipment. Consequently, the surgical hospital has been fully accepted as a requirement for all operations, and this change has taken place within a few years.

At present we are in a stage of transition in regard to acceptance of the services offered by the hospitals. There are men and women still living who can remember well the days when even the most

Spittal Büch/ durch den hoch
gelehrten Herren / Theophrastum von Hohenheim/
 beyder Arzney Doctorum geordnet. Und seht/ Gott zu lob und
 allen Menschen nutz/ rechtschaffen. Durch den/ rechter ord-
 denlicher Kunst/ liebenden Herren/ Adamen von
 Bodenstein / Philosophen vund
 der Arzney Doctorum in
 tract geben.



Freundtlicher lieber Leser/ wende das blat herum/ so erfarestu
 was diese Büchlein inhalt/ ist/ werdt dich gewißlich solchen grossen
 Schatz/ mit kleinem gult kaufen/ nicht
 gewesen.

✱ Ariz. C. Ariz. ✱

THE SPITTAL BÜCH, By PARACELSUS

The physician, Theophrastus Bombastus von Hohenheim, who lived in the first half of the sixteenth century, is known more commonly under his assumed name, Paracelsus, an epithet meant to denote his superiority to the Roman medical author Aurelius Cornelius Celsus, who lived during the reign of Tiberius Cæsar. Celsus was not a physician, rather a dilettante in medical matters, but his works are excellent and were widely used in the time of Paracelsus.

Paracelsus was one of the three outstanding physicians of the sixteenth century; the other two were Vesalius, who founded modern anatomy, and Paré, who reformed surgery. Paracelsus was one of the boldest and most original minds of his time; he was largely instrumental in freeing medicine from the hold of ancient tradition. He wrote in the vernacular instead of the customary Latin.

serious operations were as a matter of course performed in the home. Such a procedure is now archaic. But there are still many people who, while they accept fully the surgical aspects of the hos-

pital, have not yet realized that it is equally important for medical and maternity purposes. That full realization will come in a few more years; it will then be as old-fashioned to care for a serious illness in the home as it is now to perform surgical operations there. The hospitals must grow and build in this expectation if the people of our communities are to receive due and proper services.

CHAPTER TEN

MOTHER AMERICA



NATIONAL Hospital Week, Cancer Week, Tuberculosis Week, times given over to intensive, driving publicity carried out nation wide by great philanthropic organizations in the interest of a better appreciation of modern medical science—to save lives. And then in May there is Mothers' Day. A great philanthropic movement for better care in maternity? Not at all! It is a commercialization of sentiment. The mothers are to be given a flower by their sons and daughters. An excellent business opportunity for the florist—no one objects to that. Sentiment and commerce should mix once in a while. The danger lies in the fact that the powerful combination tends to obscure a philanthropic organization—the Maternity Center Association, the most deserving perhaps of any—which tries on this same day to tell the public something of the ghastly neglect of mothers in the United States. Let us consider the situation of motherhood in America and also this peculiar institution called Mothers' Day.

Great advancements have been made in means for rendering childbirth safe for the mother and for the child. During the last four hundred years physicians have studied this process; they have devised ways of overcoming the difficulties of childbirth until now these dangers can be reduced to a very low degree. In our country we have physicians specializing in obstetrics, who are as skilled as any to be found elsewhere in the world. Our nurses are as well trained as those of any other country. We have many excellent maternity hospitals. Those fortunate women who are able to avail themselves fully of the advantages offered by modern medical science undergo childbirth with a very negligible risk indeed. These are

pleasant aspects of the great advancement in means of insuring maternal welfare. They are justly matters for pride. We can supply the means for making childbirth safe for the American mother. We can. But do we? Emphatically, no! The means of saving lives and



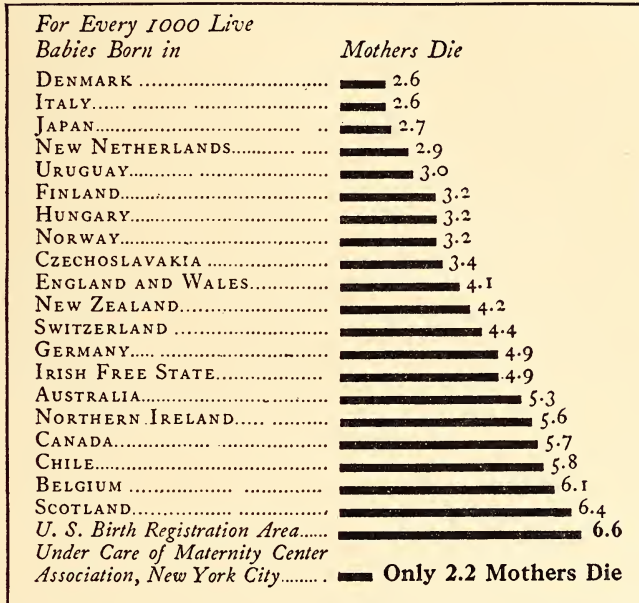
THE DOOR FOR THE DESERTED INFANTS

From an old wood-cut. The opening in the monastery wall is intended for the reception of infants unwanted by their parents. The treatment of undesired children has gone through considerable evolution. The Romans exposed them on the temple steps with perfect propriety; they might be taken from there by a passer-by, adopted or trained as courtesans, or if not, they were left to die. Under Christian influence foundling homes were established, but it is only in recent years that the good intention of caring for deserted children has been combined with the practical means for providing humane care.

insuring health are not available to most of the mothers in the United States.

In many matters we have reason to be proud of the attainments of our country. We have accepted and popularized the technical aspects of material science more extensively than has any other country. We have more telephones, more automobiles, and more bathrooms than all the rest of the world. We have the tallest build-

ings, the most paved roads, and the most expensive system of elementary education. We lead the world in many ways, and to our disgrace we lead it in mortality of mothers at childbirth. In this country of ours—which celebrates Mothers' Day—we have a higher death-rate from childbirth than does any other country from which statistics are available. We have held this unenviable preëminence now for some twenty years. While we have accepted and popular-



THE MATERNITY MORTALITY RATES OF TWENTY-ONE COUNTRIES, 1929

From a bulletin issued by the Maternity Center Association, New York City.

ized the interesting toys of science we have at the same time ignored many of its deep humanitarian aspects.

We look with some contempt upon those countries that have been slower than we in achieving technical advancement. One hears much talk—sanctimonious talk—of “Mother India” and the sending of missionaries to those benighted countries that do not have telephones and automobiles in the same profusion that we do. Let us talk instead of “Mother America” and do some missionary work at home.

Consider for a moment the actual statistics in the matter. There are more than twenty countries that make full returns on maternity mortality. Some others which are less advanced, less civilized if you will, keep no records of these births and deaths. The United States in this respect falls midway between the two. We make only a partial return, for some sections of our country have not yet started to record these vital statistics. The information given in the mortality returns is in terms of the number of mothers who die for every thousand babies born alive. The figures range for different



A LYING-IN ROOM IN THE MIDDLE AGES

In nearly all of the old pictures of the lying-in room the nurse is shown washing the child.

countries from 2.6 maternity deaths per thousand babies at the lowest, to 6.6 at the highest.

When the countries are arranged in the order of their respective maternity risks, we find that in safety Denmark and Italy lead the world, with Japan as a close second. In the middle of the list are England and Wales, New Zealand, Switzerland, and Germany, with maternity death rates ranging between four and five mothers per thousand babies. At the bottom of the list come Chile with 5.8, Belgium with 6.1, Scotland with 6.4, and, at the very bottom, the United States with 6.6.

These figures for our country translated into actual deaths mean that each year in the United States 16,000 mothers die, leaving behind them their new-born babies. As compared with Denmark and Italy, 10,000 of these mothers die unnecessarily; 10,000 of these

lives could be saved. Moreover, the deaths are only a part of the tragedy; 16,000 mothers dead means the very soul taken from 16,000 families. Think of it—16,000 disorganized, disrupted homes, a hazardous future for the new-born babies, an uncertain one for the older children—the orphanage, the street, crime, the reform school, the prison.

You who are accustomed to reading in your papers of deaths by thousands from earthquakes and disasters become calloused to deaths in large numbers; one in the house next to yours brings home to you more reality than a thousand at a distance. But imagine for a moment that you live in a tenement, crowded, teeming with old life and young life. The hallways resound with infant voices. In the midst of this stir, in a bare room across the hall there stands a numbed, bewildered father; to him cling four young children crying their wants; in a crib the new-born baby wails its discomfort, and on the bed is the body of the mother whose death has brought disaster to this family.

We as a country would rise to war if one American mother were deliberately shot by an alien government. Such an outrage would appal us and stir our deepest sentiments. Yet at the same time, such is our nature, we stand by unconcerned while 10,000 mothers die merely from lack of aid. The means exist to prevent these deaths, but the fact that the deaths continue year in and year out signifies that the means are not made available to the mothers who need them. We are recklessly indifferent to their wants—the figures for mortality prove it.

Our present lack of interest in the needs of the child-bearing woman is a survival of a very ancient attitude. For centuries in the Christian era this indifference found expression in the cruel and bigoted belief that woman's suffering and death were but rightful penalties for her part in the fall of man in the Garden of Eden. Enlightenment has to a great extent done away with that belief, but the indifference remains and is merely covered over now with another sophistry—that the difficulties of child-bearing result from the enervating influences of modern civilization and urbanization. The exponents of this belief are of the opinion that the women of aboriginal peoples living in their native tribes have no difficulties

at childbirth. Such is not the case. Obviously, tribal women who have no difficulties at childbirth survive; those who have difficulties die—and there are many such. We know of the survivors only, for savages keep no statistics. No—the modern woman is not decadent



AN OBSTETRICAL CHAIR OF THE FIFTEENTH CENTURY

The French obstetrician, Mauriceau, introduced the practice of using a bed for childbirth. Prior to that time and for some two centuries afterward, delivery, as a rule, took place with the woman in the sitting position, as is still practiced among many native peoples. Sometimes the parturient woman was supported on the lap of another woman or on an especially made chair. This chair is mentioned in the Old Testament; Pharaoh commands the midwives to slay all Jewish male infants "when you do the office of the midwife to the Hebrew women, and see them upon the stools." The obstetrical chair, or rather stool, shown here is a simple variety; more often they were in the form of high-back chairs. The midwives of Europe trundled them from patient to patient as late as the nineteenth century, unless, as was the case in Holland, they were furnished as part of the bride's trousseau.

in her functions. Even in our country, bad as are the conditions, she is better off than in the native state.

The exponents of this theory of decadence under civilization advance the idea that child-bearing is a normal and natural physiological function of women—specific to that sex but as natural as digestion and requiring no greater supervision. That belief is a con-

venient support for indifference. So long as it exists, a cruel nature will take a continuing toll of those women in whom the process happens to be abnormal or who do not receive proper care. If we are to avert tragedies, we must look upon child-bearing in another light. It is this: Child-bearing is an illness of nine months, requiring constant care and supervision; then an episode as grave as a surgical operation, needing as excellent medical care; and finally a period of convalescence, as from an operation, lasting several weeks. When the process of child-bearing is looked upon in this light and treated accordingly in all women, the mortality in this country will diminish to the lowest level attainable today, approximately one-third of the present death-rate.

But to achieve this end will require much education. It is on this point that we come to a condition peculiar to our own country. In some of the nations that have the lowest death-rates for mothers there is governmental supervision of maternity care. We, however, with our type of government, do not as a rule favor such intervention and control. Our republic is organized on the assumption that every man and woman enjoying its privileges is educated sufficiently to take a part in the government. To this end we spend billions of dollars in teaching boys and girls to read and write, to become self-supporting, and to be conversant with political matters. But we discriminate against mothers. We do not spend our money to educate women to a knowledge of motherhood. The women of this country have neither supervision in maternity nor education for it.

Only a comparatively few women can afford to employ a physician throughout the full period when they need observation and information. Millions can barely manage to have this aid for even the short period of birth, and some must go without it entirely.

I have said that the mortality for mothers in this country could, if we made the effort, be brought as low as that of any country in the world. To prove this point I want to describe an experiment that is being carried on in one district in New York City. Similar experiments are being conducted in other cities and also in the mountains of Kentucky, but I am going to describe the one in New York.

The work there is undertaken by the Maternity Center Associa-

tion, an organization of women aided by a medical advisory board and supported by voluntary contributions. Its purpose is to diminish



THE VISIT OF THE MIDWIFE

From an old English book. The table set with chicken and ale is a realistic touch; midwives of those days were notorious for their gluttony. The care of the child-bearing woman was entirely in their hands; the physician was excluded from the lying-in room. Until the sixteenth century the midwives received no especial training and were often women of the poorest conceivable type for the work, like Dickens' Sairey Gamp. A training-school for midwives was opened at the Hôtel Dieu at Paris in the sixteenth century. A male physician was called to attend La Vallière, mistress of Louis XIV. Subsequently male midwifery became fashionable, although it met with considerable opposition from the midwives and encountered difficulties in the prudery of patients, other than those in royal circles, among whom modesty was not carried to this extent. Frequently the early physicians were forced to serve their prudish patients "under the sheet"; that is, one end of the sheet was tied to the patient's waist and the other about the physician's neck. He made his manipulations blindly beneath this covering. The introduction of the physician into midwifery led to the development of modern obstetrics.

maternity mortality. The district in which it operates is along the East River, a strip of the city a little more than a quarter of a mile wide and three miles long. It is a district of crowded tenements.

The association offers to the women in this district class instruction in motherhood. Expectant mothers are told how to care for themselves and how to prepare for the baby. At various centers these mothers are given continuous medical and nursing supervision. When the baby arrives, a volunteer nurse attends, and assists the doctor in every way possible to aid in the comfort and safety of the mother. She takes on her shoulders the responsibilities of the household and the care of the older children, thus bringing peace of mind to the mother. The nursing supervision continues until the baby is six weeks old.

Now you may raise the point that you would not care to accept this charity service. Probably you don't need to. Perhaps you can afford complete medical aid—a preliminary examination that is important in averting the possible difficulties at birth by predetermining the size of the pelvis, the repeated determination of the blood-pressure, the best medical service, and a private nurse. But if you don't need the services extended to other women by maternity associations, what are you doing to assist those mothers for whom this service is life-saving? Charity, after all, is merely a point of view. The financial burden of our public schools rests alike on all, whether or not they have children to educate, but you who have children don't regard schooling as a charity. You don't insist on sending your children to a private school to avoid the stigma of charity. No indeed; schooling is an inalienable right of every citizen. And why isn't it just as much an inalienable right of every mother to have education and aid in maternity?

Here are the results of the work of the Maternity Center Association in this district of New York. Among those women living there who do not come under the care of the association the maternity death-rate is 6.2 mothers for every thousand live babies. Among the mothers in the same district who do come under the care of the association the rate is 2.2 mothers per thousand babies—the lowest maternity death-rate in the world, in a country which has the highest maternity death-rate in the world. It can be done, for it is being done. It will be done for the whole country when the women of the United States demand adequate maternity care.

And now what is your reaction to Mothers' Day—the day of sen-

timent and business? Each year there are millions of flowers presented to mothers. In view of our manifest indifference to their



A CRADLE OF THE FIFTEENTH CENTURY

The earliest cradles were merely boxes with detachable rockers; sometimes they were hooded, as in the one illustrated earlier in this chapter. The baby at birth was bathed; then it was salted all over and its head bandaged to shape it. Next it was bound tightly in swaddling bandages until it was unable to move. This swaddling was continued for several months, the bandages being taken off for a few minutes each day. About half the children so treated died during the first year of life.

lives, that seems to me to be a shameful procedure—a hypocritical gesture typical of people who wish to believe that they can replace a deep obligation by a shallow, sentimental flourish. Face the facts.

A flower—millions of flowers are presented to those women who have survived childbirth in this country. The fortunate ones—the survivors—get a flower. But what are the sons and daughters, the presenters of the flowers who thus cheaply achieve a glow of self-satisfaction, doing to prevent the unnecessary deaths of ten thousand mothers this year? They can be saved, but not by holding out to them the promise of a potted plant.

CHAPTER ELEVEN

AN UNCULTURED NATION



THE medical care and medical education that can make America safe for mothers had its beginning here in the days of our Revolutionary War. And so I want to tell something from the life of one of our great physicians of that period. There are many names famous in our history that I might choose from—physicians who gave their services and their lives for the independence of this country.

In no war and in no country was there ever a greater example of patriotism than that of Dr. Joseph Warren of Boston, who dispatched Paul Revere to arouse the minute-men, and who declined to accept a proffered commission, preferring to shoulder his musket and take his place in the ranks under Colonel Prescott at Bunker Hill. He gave his life on the same day that he joined in the struggle there. His brother, Dr. John Warren, later director of the military hospital at Cambridge, came to Bunker Hill to search for his body, and in attempting to pass the lines was wounded with a bayonet in the hands of a sentry.

One of our most gallant medical patriots was Dr. Hugh Mercer, who served as brigadier general. He was mortally wounded at the battle of Princeton, and in his last moments was attended by the famous Dr. Benjamin Rush, one of the five medical men who signed the Declaration of Independence.

Dr. James Thacher of Massachusetts, our first medical biographer, has left us one of the best word-pictures of the personality of George Washington. He was at West Point during the capture of the ill-fated André and gives a thrilling account of this event in his *Journal during the American Revolution*.

From Delaware there came Dr. James Tilton, who fell a victim of typhus fever during his work in the hospitals of the war, but survived, to become surgeon-general of the United States army during the War of 1812.

MILITARY JOURNAL

DURING THE

AMERICAN REVOLUTIONARY WAR,

From 1775 to 1783,

DESCRIBING INTERESTING EVENTS AND TRANSACTIONS OF THIS PERIOD,
WITH NUMEROUS

HISTORICAL FACTS AND ANECDOTES.

FROM THE ORIGINAL MANUSCRIPT.

—

TO WHICH IS ADDED

AN APPENDIX,

CONTAINING

Biographical Sketches

OF

SEVERAL GENERAL OFFICERS.

BY JAMES THACHER, M.D.
LATE SURGEON IN THE AMERICAN ARMY.

As Americans we hail with delight any attempt to rescue from oblivion the words or
actions of those whose names we have been taught to 'revere.'

—

BOSTON:

PUBLISHED BY RICHARDSON AND LORD.

J. H. A. Frost, printer.
1823.

DR. THACHER'S MILITARY JOURNAL

James Thacher was born at Barnstable, Massachusetts, in 1754, studied medicine by apprenticeship under Dr. Abner Hersey, and in 1775 entered the army as assistant surgeon. He was at West Point in 1780 on the occasion of Arnold's treason and the capture of André; he gives an account of the events in his *Journal*. He was awarded an honorary degree of M.D. by Harvard in 1810.

Then also there was the unfortunate Dr. Benjamin Church of Boston, the first director-general and chief physician of the American army, who was accused, probably unjustly, of treason and con-

demned to prison by a court-martial over which George Washington presided.

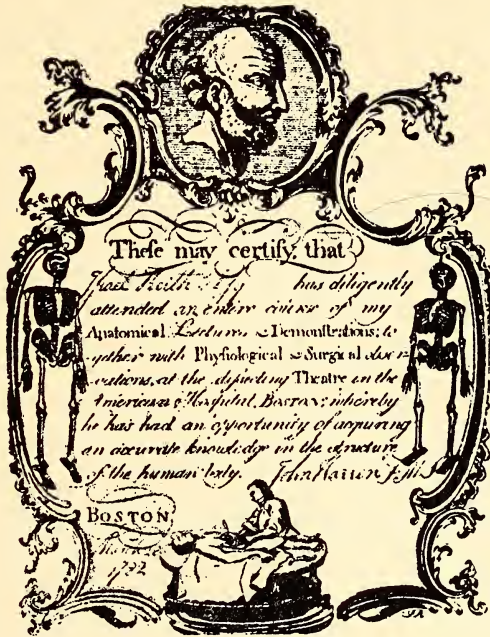
The man appointed to succeed him was Dr. John Morgan of Philadelphia, forever famous in medical history as the leading spirit in founding our first medical school, that of the College of Philadelphia, which has now become the University of Pennsylvania. He was one of the most distinguished physicians of his time and a man of high ideals. He organized the medical department of the army and brought it under rigorous discipline. He served nobly and devotedly, but he served in a time when the Continental Congress, harried by the uncertainties of the war, was willing to give credence to unfounded and absurd rumors. He was summarily dismissed from the army by this body on the ground of inefficiency. He protested, demanding a court of inquiry. After two years' delay this request was granted; he was completely exonerated. But in the meantime his services were lost to the army; the injustice of the charges broke his spirit; the worry injured his health; and his fortune was spent in the cause of the war. So a great and noble character in our Revolution was lost to his country through legislative inefficiency.

Dr. Morgan was succeeded in office by Dr. William Shippen, Jr., of Philadelphia—the second in seven generations of American physicians bearing his name. Like his predecessors, Church and Morgan, he was accused of grave offenses by the restless politicians of the time, but he successfully defended himself and continued in office until 1781, when he resigned and was succeeded by Dr. John Cochran.

Any one of the doctors whose names I have mentioned, and many others besides, could be selected as a representative physician of the Revolutionary period. From among them I have chosen Dr. William Shippen, Jr., but I have selected him for reasons other than his war activities. The period was teeming with physicians who were devoted patriots, but I wish to show a gentler and less martial side of our physicians of the Revolution. And Dr. William Shippen was the first physician in this country to organize a school to teach obstetrics. He was a pioneer champion of the proper medical care of mothers.

He was born in Philadelphia in October of 1736. At the age of

eighteen he graduated from the College of New Jersey, now known as Princeton University. For the next four years he studied medicine under his father, who practiced in Philadelphia. There were at that time no schools of medicine in this country, and so he went



CERTIFICATE OF ATTENDANCE AT JOHN WARREN'S LECTURES, 1782

The plate for this certificate was engraved by Paul Revere. Dr. Warren was born at Roxbury, Massachusetts, in 1723, graduated from Harvard in 1750, and afterward studied medicine with his brother Joseph, at Salem. Appointed hospital surgeon of the Continental Army, he rendered distinguished service at Trenton and Princeton. He was the leading surgeon of his time. In 1780 he commenced a series of anatomical demonstrations to which the certificate illustrated pertains; in 1783 he was appointed professor of anatomy and surgery in the newly established medical school at Harvard University.

abroad to complete his education. He studied in London under the greatest physicians of the time, particularly John and William Hunter. He obtained his degree of Doctor of Medicine from the University of Edinburgh, at that period the finest medical school in the world. He wished to continue his studies in France, but at that time England and France were at war and it was impossible

for him to obtain a passport. But he overcame this difficulty by obtaining appointment to the position of traveling physician to a lady with consumption who, having influence at court, had managed to have King George II procure for her a special passport permitting her to go to southern France. In this capacity Dr. Shippen went to the Continent and while there met many celebrated physicians. Finally at the age of twenty-six, after four years of European training, he returned to Philadelphia.

I have detailed the steps of his education in order to make clear that this man, who was later to be the director of the medical staff in the Revolutionary War, was not the homely product of Colonial medical apprenticeship. He had received as fine a medical training as was available at that time. John Morgan, who preceded him in office, and Benjamin Rush, who served under him in the War, were also graduates of Edinburgh and were as well trained in medicine as he was.

The physicians whom young Shippen met in England were extremely anxious to further medical education in the Colonies. Dr. John Fothergill of London, a famous Quaker physician, gave Shippen a series of crayon pictures illustrating the anatomy of the body which he had especially made by Remsdyck. They were to be given to the hospital of Philadelphia to assist in anatomical instruction. The pictures are still at that institution and are among its most cherished possessions.

The spirit of professional helpfulness, so strongly indicated by the gift of Dr. Fothergill, affected Dr. Shippen. He in turn wished to share his knowledge of anatomy and obstetrics with his fellow-countrymen who were unable to undertake their medical studies in Europe. So he decided to open first a school for anatomical instruction. Earlier attempts had been made in this direction, but they had not been successful. Anatomy was a difficult subject to teach because of the necessity of dissection. Young men training to become physicians could learn many branches of medical practice by apprenticeship to older physicians, but their training was fundamentally incomplete because of the lack of anatomical study.

In launching his course of instruction Dr. Shippen inserted an announcement in the newspaper to the effect that "a course of ana-

TO THE HONORABLE
The CONGRESS of the United-States
OF AMERICA.

And to every FRIEND and WELL-WISHER
To the RIGHTS and LIBERTIES of MANKIND,

THE FOLLOWING
VINDICATION
OF HIS PUBLIC CHARACTER.

In the Station of DIRECTOR-GENERAL
OF THE MILITARY HOSPITALS,

And PHYSICIAN in CHIEF
TO THE AMERICAN ARMY.

With all deference to Rank and Authority,
AND WITH ALL BECOMING FREEDOM,

CHARFULLY SUBMITTED

THEIR MOST RESPECTFUL
AND MOST OBLIGED
HUMBLE SERVANTS,

JOHN MORGAN

DR. MORGAN'S VINDICATION

John Morgan was born in 1735 at Philadelphia, and received his degree of M.D. at Edinburgh, Scotland. He has the distinction of being the founder of the first medical school in America, that which is now the medical department of the University of Pennsylvania. Following the dismissal of Benjamin Church, first medical director of the Continental Army, Morgan was appointed to this position, 1775. He at once set about reorganizing the medical affairs of the army, then in a most deplorable state of confusion. His efforts aroused jealousy. Finally he appealed to Congress to settle the dispute occasioned by the insubordination of Dr. Stringer, director of medical affairs in the northern part of New York State. Congress appointed a committee to investigate the affair and, acting upon the report, dismissed both Morgan and Stringer. In just indignation Morgan published the pamphlet, *A Vindication of His Public Character in the Station of Director General of the Military Hospitals and Physician-in-chief to the American Army*, Boston, 1777.

Dr. Morgan is said to have been the first man in Philadelphia to carry a silk umbrella.

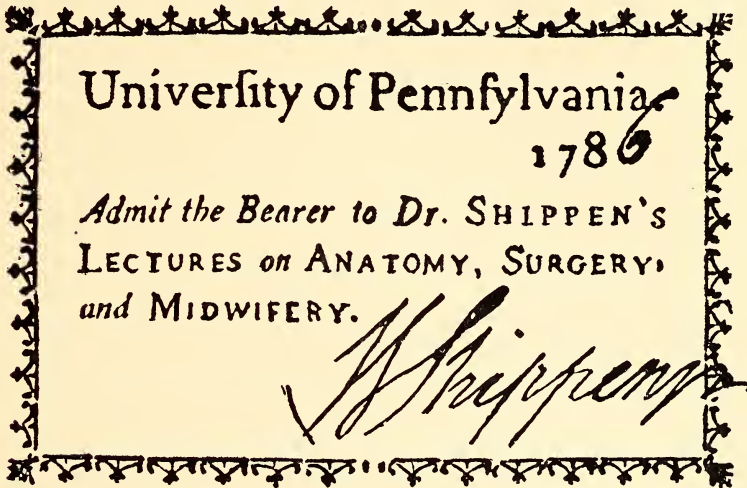
tomical lectures will be open this winter in Philadelphia for the advantage of the young gentlemen now engaged in the study of physic in this and the neighboring provinces, whose circumstances and connections will not permit of them going abroad, for improvement, to the anatomical schools in Europe; and also for the entertainment of any gentlemen who may have the curiosity to understand the anatomy of the human frame." The lectures were to be given at his father's home in Fourth Street.

Ten pupils applied the first year and many more the next. But there were peculiar difficulties in the teaching of anatomy in those days. Philadelphia was the metropolis of the Colonies; its population was about forty thousand, while that of New York City was only thirty thousand and that of the entire country less than four million. Yet though Philadelphia was the cultural center of the country, the people of even that enlightened city were ignorant of the real purpose of anatomical dissection. They did not realize that the study was a necessary part of the training of the physicians into whose hands they entrusted themselves. In consequence of the popular distaste for dissection, there were violent protests against Dr. Shippen's school. The building which he used was attacked several times, and he was forced to conceal himself to avoid personal injuries. On one occasion he was attacked on the street by a mob; a gun was fired at him, the bullet passing through his carriage; he escaped by running up an alley.

Nowadays our laws require that a physician shall be thoroughly educated in human anatomy before he is allowed to practice medicine; furthermore the law makes such necessary provisions that he may gain this knowledge by dissection. But in the eighteenth century the physician obtained his education under difficulties and sometimes even in the face of personal dangers. As late as 1788 there was a violent outburst against dissection in New York City which resulted in the so-called Doctors' Mob. The physicians from one of the hospitals were forced to seek refuge in jail to escape from the excited mob. The jail was attacked and it was necessary to call out the militia to quell the disturbance. In the encounter that followed seven of the rioters were killed and several more were seri-

ously wounded. The next year the legislature of New York authorized dissection of the bodies of persons executed for burglary, arson, and murder.

But to return to Dr. Shippen and his educational endeavors. In 1765, three years after he had commenced his anatomical lectures, the Board of Trustees of the College of Philadelphia voted to estab-



TICKET OF ADMISSION TO DR. SHIPPEN'S LECTURES

Like John Morgan, Shippen obtained his degree of M.D. at Edinburgh, Scotland; he succeeded Morgan as medical director of the Continental Army. In 1765 he began a series of lectures in midwifery, the first formal instruction in obstetrics given in this country, and in connection with these lectures he established a small lying-in hospital, "under the care of a sober, honest matron, well acquainted with lying-in women." This institution was the first maternity hospital in America. He held the chair of anatomy, surgery, and midwifery in the medical school of the University of Pennsylvania.

lish a medical school in connection with the College; they appointed Dr. Shippen professor of anatomy and surgery. As I have said, the school subsequently became the medical department of the University of Pennsylvania. A few months before these events took place Dr. Shippen had opened a private school for instruction in obstetrics—the first systematic instruction given in this subject in this country. Here is a portion of his announcement in the *Pennsylvania Gazette*:

Doctor Shippen, Jr., having lately been called to the assistance of a number of women in the country in difficult labor, most of which was made so by the unskilled old women about them; the poor women having suffered extremely, and their innocent little ones being entirely destroyed, whose lives might have been easily saved by proper management; and being informed of several desperate cases in the different neighborhoods . . . attended with the most painful circumstances, too dismal to relate. He thought it his duty immediately to begin his intended course in midwifery . . . to instruct those women who have virtue enough to own their own ignorance and apply for instruction, as well as those young gentlemen now engaged in the study of that useful and necessary branch of surgery, who are taking pains to qualify themselves to practice in different parts of the country with safety and advantage to their fellow citizens.

Dr. Shippen's school of obstetrics was the very beginning of the trained medical assistance directed to help the mothers of this country. But like that of anatomy, this instruction was opposed, although for a different reason—prudery; and prudery was more difficult to contend with than violence. Something of the ridiculous attitude of mind that hindered the advancement of this cause may be judged from a notice in the *New York Weekly Post Boy* of 1762 commenting on a Dr. Atwood, who, it says, "is remembered as the first doctor who had the hardihood to proclaim himself a man-midwife; it was deemed scandal to some delicate ears, and Mrs. Grannie Brown, with her fees of two dollars or three dollars, was still deemed the choice of all who thought that women should be modest." That was a prudery that cost many lives.

We can with our modern sophistication venture to laugh at the prudery of our ancestors of the Revolutionary period. But although we have discarded some of this prudery we have developed in its stead an indifference to mothers that is vastly more costly in lives.

Dr. Shippen set an example which we have not followed. In connection with his school of obstetrics he founded a lying-in hospital, the first institution of its kind on the American continent. In this hospital the students from his school of obstetrics assisted in deliveries; they received their training by actual experience under the constant supervision of a highly trained man; that is the only way in which adequate education can be given in obstetrics.

Eleven years before the signing of the Declaration of Independence, Dr. Shippen, by his example, showed that he recognized

the indispensability of thorough practical training for men who are to be trusted with the care of women in childbirth. He recognized also that the lying-in hospital connected with a school is the only place which affords an opportunity for making the medical

Samuel Whiting,

*Next Door to the Court-House, Great-Barrington,
Has a handsome (little) Assortment of*

Dry Goods and Groceries.

He flatters himself that those who please to call on him, will not be dissatisfied with the Quality or Price of his GOODS.

Abraham K. Whiting,

At the same Store,

Is furnished with a moderate retailing Assortment of

MEDICINES:

Where Gentlemen of the Faculty, who favour him with their Recipes, may depend on having *justice* done their Prescriptions.

∴ *THEY* deal for ready Pay only, and will allow the highest Price for ASHES in their Season, and other Articles of Produce usual in the Mercantile Line

NEW-YORK. Printed by W. MURDOX, at his Printing-Office, No. 231 Green-Street.

A PHARMACIST'S HANDBILL OF 1784

The brothers Whiting sold dry goods, groceries, and pharmaceutical supplies. The final note on the handbill is a commentary on the finance of the period. Cash payment only was accepted, but wood ashes served as tender, as did also many other marketable commodities. The ashes were used in the preparation of soft soap, the alkali being leached out of them. (Reprinted through the courtesy of the author and publishers from "Four Thousand Years of Pharmacy" by Charles H. LaWall.)

discoveries which will provide means for diminishing both the hazard and the suffering of childbirth.

One hundred fifty-six years have passed since the Declaration of Independence; in these years we have grown to be a great and rich country; our material progress has gone beyond even the dreams of our founders. And I wish I could say also that we have grown in culture. But I cannot.

There is no better index of the culture of a country than the care given to the child-bearing woman. That care is measured in the safety of childbirth. Today the maternity mortality of the United States is not only the highest of any civilized country, but, what is even worse, it is higher than it was ten years ago.

In an address delivered at the dedication of the Chicago Lying-in Hospital in 1931, the statement was made that the excessive mortality in this country is, in part, due to defective medical education. The speaker, an outstanding teacher in the field of obstetrics, expressed our national attitude toward the situation in these words, "Self-satisfaction and complacency appear to be distinguishing earmarks of American civilization, and we tend to delude ourselves into believing that our institutions are the best in the world, including universities and hospitals."

In contrast to this popular delusion we have the fact that from the time of the Revolution until 1888, when the Sloan Maternity Hospital was opened in New York City, there was not a single institution in the entire country especially erected and equipped for the purpose of teaching obstetrics and studying childbirth. Since then nine or ten such institutions have been erected, but most of the medical schools of this country are still dependent on small services in general hospitals for the obstetrical training of students and some do not even have this facility.

The medical schools do not impose this handicap except from necessity. Every medical school would immediately erect a lying-in hospital, for the proper training of students, if the American public were interested sufficiently in the needs of mothers to make the necessary funds available and to require by law adequate practical training. The fact that very few of these institutions exist is not a matter fundamental to the economic conditions of this country; it is an expression of indifference to the needs of mothers. Are we an uncultured people?

CHAPTER TWELVE

AMERICA'S MOST DISTINGUISHED WOMAN



IN JULY of the year 1887, after a brief service at the Mount Auburn Cemetery near Boston, the Rev. Dr. Nicholas, of Maine, wrote to Dr. Tuke of England these words: "Thus has died and been laid to rest in the most quiet, unostentatious way the most useful and distinguished woman America has yet produced."

The truth of that statement stands unchanged today. America certainly has never produced a woman more deserving of an everlasting place in honor and fame than Dorothea Lynde Dix.

One of her minor accomplishments—and I can truly call it minor when it is compared with her greater work—was the superintendency of nursing in our War of 1861, which she successfully accomplished at the age of fifty-nine. There have been few indeed whom our country honored as it did Miss Dix at the close of that war. Here are the words of an order issued by the War Department, given over the signature of Edwin M. Stanton, Secretary of War:

WASHINGTON CITY, December 3, 1866

In token and acknowledgement of the inestimable service rendered by Miss Dorothea L. Dix for the Care, Succor, and Relief of the Sick and Wounded Soldiers of the United States on the Battle-field, in Camps and Hospitals during the recent War, and of her benevolent and diligent labors and devoted efforts to whatever might contribute to their comfort and welfare, it is ordered that a Stand of Arms of the United States National Colors be presented to Miss Dix.

All other proffered honors she refused. The flags thus officially presented to her she bequeathed to Harvard College, where they now hang in its Memorial Hall. Her work in this war is compara-



A SAINT EXORCISING A DEMON

In the Middle Ages madmen whose hallucinations took the form of religious fervor were often regarded with veneration, but those whose ravings were blasphemous or obscene were supposed to be possessed by demons. Treatment for possession was exorcism by the priest. If this measure failed, the blame was placed on the madman's obstinacy, and he was treated cruelly, chained, whipped, and starved into submission. The insane man shown here had evidently failed for some time to respond to religious ritual; irons are about his wrists and ankles, and an attendant holds a whip to his back. The special power of the saint, probably St. Rombant, has resulted in driving the demon from him. It is just on the point of leaving his mouth and darting away.

ble to the heroic task carried out by the English woman, Florence Nightingale, during the Crimean War. But the greater accomplishment of Dorothea Dix, the one which completely overshadows her part in the war and which gives to her the title of the most useful and distinguished woman America has yet produced was effected in time of peace. Without the stimulus of war, driven on only by what she felt was her duty to suffering humanity, she brought into being by her efforts alone the era of humane care of the insane. She was responsible for an alteration in our civilization, one of great cultural significance.

When she commenced her work of reform, the American people made little or no provision for the humane care of men and women who were mentally ill—these people were outcasts. The American public tolerated the neglect of the insane and were indifferent to the grossest brutalities which were practiced upon them. Yet in the lifetime of one woman and through her efforts, our states erected their great asylums and public sentiment underwent a complete alteration. Dorothea Dix lived to see this public so changed from their former views that they arose in violent protest over a very minor act of unkindness to an inmate of an asylum, whereas a few years before unspeakable brutalities had been tolerated with no expression of concern.

Dorothea Dix did not originate the practice of treating the insane humanely; her work was to drive that idea into the consciousness of the American public and shape their sentiments until they were able to perceive for themselves that it was their duty to provide this humane care and to look upon the insane not as beasts, but as unfortunate sick men who were their own brethren.

Let me sketch very briefly the attitude toward the insane in the years preceding her work. In early days in Europe the insane were believed to be possessed by demons. Accordingly they were exorcised by church ritual, and if their mania persisted, they were either treated brutally for their stubbornness in refusing to relinquish the demons or else they were burned as witches. The idea of possession by demons was gradually discarded, but there followed no betterment in the treatment of the insane; rather, the reverse. They were then looked upon as wild, unreasoning beasts

deserving of no pity; to be brought under control by force. During the sixteenth, seventeenth and eighteenth centuries the treatment of the insane was at its worst. No sympathy was extended to them; unspeakable atrocities were committed upon them; they endured incredible suffering. They were chained in dungeons, beaten, tortured, or exhibited as curiosities to the people of a Sunday afternoon.



TWO GIRLS POSSESSED BY DEMONS

Belief in possession by demons of itself led to manifestations of this condition. People, girls particularly, who are especially suggestible and who unconsciously desire to attract attention to themselves, readily fall under the sway of such a belief and enact all of the symptoms they have heard described or seen in others. Such hysterical manifestations are usually colored by prevailing beliefs and superstitions and have played a part in witchcraft, as in the epidemic among the Ursuline nuns at Loudun in the sixteenth century and in the epidemic hysterics such as the dancing mania.

The Lunatics' Tower of Vienna and Bedlam of London, prisons for these unfortunate people, charged admission of visitors and were conducted like museums. Bedlam was originally named St. Mary's of Bethlehem, but in common use the name was shortened to Bedlam. The word has passed into the language to signify any place where there is discord, uproar, and turmoil; an everlasting commentary on the conditions that existed in that institution.

Then, just prior to the nineteenth century, almost simultaneously two men were inspired with the idea that the insane deserved hu-

mane care. William Tuke, an English Quaker, started a retreat at York to supply this care, and Dr. Philippe Pinel, a French physician, attempted successfully the experiment of taking the chains from the insane patients under his care and treating them humanely.

These radical ideas, however, made little progress. When the nineteenth century opened, America had one asylum; it was located in Virginia. Forty years later seven more had been built, but most of them were not supported by state funds and some were merely wards of general hospitals. Most of the insane, if violent, were locked in the barns or sheds of country almshouses. If they were harmless, they were sometimes auctioned off to the lowest bidders for pauper care, or else turned loose to wander through the fields and woods like the Toms o' Bedlam, of England. Still others were chained in sheds or cages on farms. The American people of that time felt that the insane man was guilty of some wrong—what it was they did not know—but they were certain that he deserved the same or even worse treatment than a sane criminal. And in the first half of the nineteenth century criminals were not treated kindly.

So much now for the situation that existed. I want next to go back a few years and follow the life of the woman who was to be the champion of these mistreated, misunderstood men and women. Dorothea Lynde Dix was born April 4, 1802, in the town of Hampden, Maine. She spent a bitter childhood in a home made unhappy by a tyrannical and fanatical father. At the age of twelve she ran away to her grandmother's home in Boston. This grandmother, a widow of some means, accepted the child and under the strictest discipline proceeded to educate her to be self-supporting. At fourteen Dorothea commenced teaching school at Worcester, Massachusetts, but after a year or two she and the grandmother returned to Boston, then a town of forty thousand inhabitants. There at the age of nineteen Dorothea founded a combined day- and boarding-school which in the course of the next few years drew its members from the most prominent families of New England. The young teacher, however, overtaxed her strength in her devotion to her school; she developed tuberculosis. There followed then some years which she spent in the less arduous tasks of educating the chil-

dren of the Rev. Dr. Channing, living in the meantime in his family. Finally, much improved in health, she took up her school once more, only to have her health again give way. A year or more of rest in England followed. We find her next, at the age of thirty-nine, in Boston, a tall, frail woman, still handicapped by ill health.



BURNING A WITCH

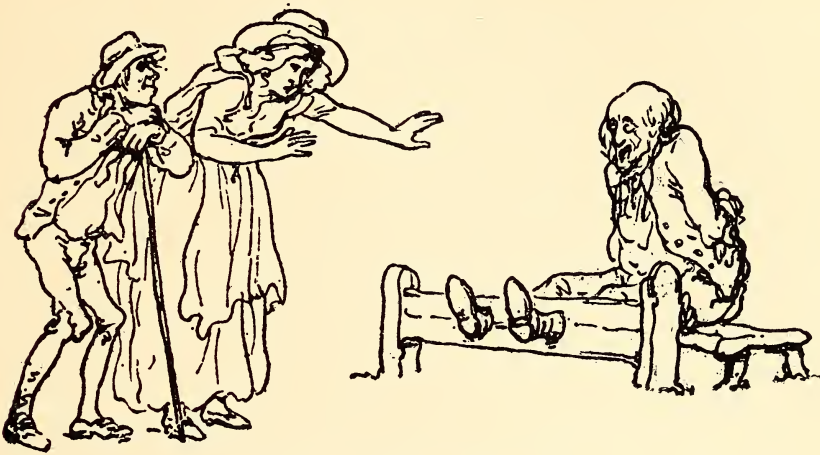
Insane women were often considered to be witches; in fact, nearly all of them must have been either insane or suffering from hysteria. One method used to detect witches was to stick pins into their flesh; the absence of pain was assumed to be proof of guilt. Today women with major hysteria may exhibit this same anesthesia, but they are no longer burned, as were the witches of two centuries ago. The demented woman shown in this illustration, made from the actual scene, was convicted of witchcraft and burned in 1882; it was the last case of its kind in Scotland. Her crippled son and daughter are shown in the foreground.

Then there occurred an event which was to alter her life and start her on the career of reform.

On March 28, 1841, she undertook to give Sunday-school instruction to the female inmates of the East Cambridge House of Correction. Here she was brought into contact for the first time with the deplorable conditions existing in the penal institutions of those days. She found twenty women, among whom several were insane, crowded together in one filthy room in which no provision

was made for either bedding or heat. She was shocked and outraged at the conditions she encountered. She brought the matter to the attention of Dr. Howe of Boston, and he protested against the situation through the columns of the Boston *Daily Advertiser*. His article was attacked, as is always the way when abuses are pointed out.

In the course of the controversy that ensued, Miss Dix quietly set out on an exploration of her own. She visited jails and alms-



A MAN IN THE STOCKS

From a drawing by Rowlandson. Even after belief in witchcraft had largely died out, at least to the extent of no longer burning the insane as witches, the madman fared little better than before. He was treated as a wild beast and disciplined accordingly. The more violent were chained and beaten for the sake of their reason; those who were merely querulous and queer were, like drunkards, sometimes locked in the stocks, as is the old gentleman shown here.

houses throughout the State of Massachusetts. For two years she accumulated her statistics of outrage and misery, so appalling in their total that even the most hardened and indifferent man could not but be affected. Her work completed, she proceeded to memorialize the Legislature of Massachusetts. Her published memorial commences with these words:

Gentlemen:—About two years since, leisure afforded opportunity and duty prompted me to visit several prisons and almshouses in the vicinity of

this metropolis—Every investigation has given depth to the conviction that it is only by decided, prompt, and vigorous legislation that the evils to which I refer, and which I shall proceed more fully to illustrate, can be remedied. I shall be obliged to speak with great plainness, and to reveal many things revolting to the taste, from which my woman's nature shrinks with peculiar sensitivity. But truth is the highest consideration. I shall tell what I have seen.

Now remember that the woman of 1840 did not have the freedom and independence of the modern woman. Her place was strictly in the home; she was without franchise; she had no voice in public affairs. But this frail school-teacher of Boston, the strictest conventionalist, swept aside all of these considerations to do her duty as she saw it.

Here is one of the least revolting extracts from her memorial:

In Worcester has for several years resided a young woman, a lunatic pauper. A few weeks since, revisiting the almshouse, judge my horror and amazement to see her negligently bearing in her arms a young infant of which I was told she was the unconscious parent! Who was the father none could or would declare. Disqualified for the performance of maternal care and duties, regarding the helpless little creature with perplexed or indifferent gaze, she sat a silent, but, oh, how eloquent a pleader for the protection of others of her neglected and outraged sex! Details of that black story would not strengthen the cause. Needs it a weightier plea than the sight of that forlorn creature and her wailing infant? Poor little child, more than orphan from birth, in this unfriendly world—a demented mother, a father on whom the sun might blush or refuse to shine!

Her memorial brought immediate action. State funds were at once appropriated to enlarge the existing asylum to accommodate the insane then held in jails and almshouses. Moreover, it brought her in contact with a group of physicians who were advocating the humane care of the insane but receiving little attention from the public. With their encouragement she next extended her work to Rhode Island, commencing her activities there in 1844. She had gained experience from her efforts in Massachusetts, and her discoveries were quickly made and published in the papers in an attempt to arouse public sentiment. She started with the case of a man named Abraham Simmons, who for many years had been chained in an unheated stone vault located on a farm. In this in-

stance she employed the whip of sarcasm, of which she had an able command.

Here is an extract from her article in the *Providence Journal* of April 10, 1844:

Should any persons in this philanthropic age be disposed from motives of curiosity to visit the place where Simmons is confined, they may rest



INSANE GIRL CHAINED IN PRISON

Until well into the nineteenth century the insane were often put in prison along with criminals. Commonly they were chained to their rough beds as in the case of the girl shown here. Straps hold her arms to her sides, an iron ring about her neck is fastened by a chain to the rod on the wall.

assured that the traveling is considered quite safe in that part of the country, however improbable it may seem. The people of that region profess the Christian religion, and it is even said that they have adopted some forms and ceremonies which they call worship. It is not probable, however, that they address themselves to poor Simmons's God.

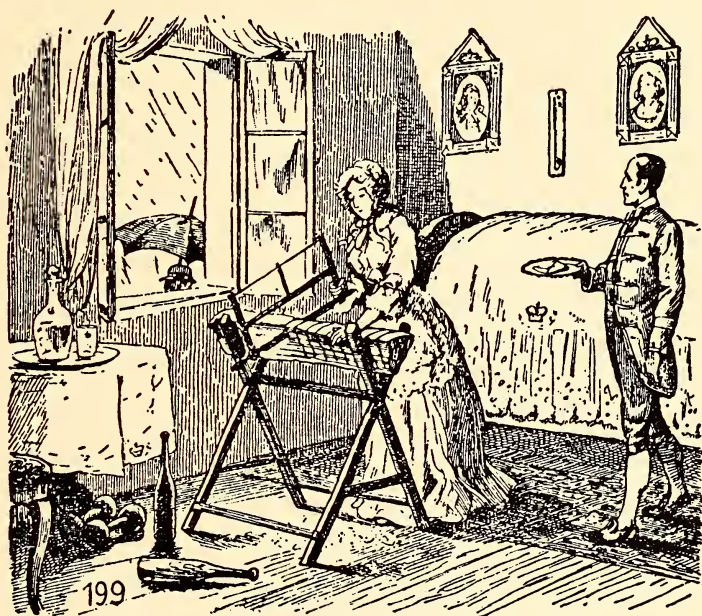
Her appeal touched Mr. Cyrus Butler, of Providence, who donated a large sum of money to enlarge and improve the asylum which now bears the name of the "Butler Hospital."

Miss Dix had tasted the first fruits of success. In these states, Massachusetts and Rhode Island, she had been instrumental in providing suitable enlargements to the existing asylums so that the insane held in jails and pauper houses could be taken from there and brought under humane treatment, securing for them freedom from chains and dungeons.

Her next work was not the supplementing of already existing institutions, but the creating of institutions in those states where none existed. She commenced with New Jersey and followed the same procedure that she had used previously. Her task of influencing the legislature to make necessary appropriations was an arduous one; the people of 1845 did not spend their money without due consideration of value received. One legislator suggested that the best way to handle the situation pointed out by Miss Dix would be to appropriate two hundred dollars to fill in the dungeons where she had found insane men held as prisoners and to plant grass over these localities, so as to remove them from the attention of further reformers. This policy of evading public duty by covering over disagreeable facts is still extensively practiced, but today its exponents are rarely so frank. The weight of evidence that Miss Dix brought forward in her memorial finally won the Legislature of New Jersey to her cause, and on March 25, 1845, it voted unanimously to erect an asylum at Trenton. Thereafter Miss Dix referred to this institution as "her first-born child." It was but the beginning of a large family.

During the next ten years her way led back and forth through the country, from Nova Scotia to Louisiana. She traveled thousands of miles under the most adverse conditions. There were few railroads and no paved roads. She went in stage-coaches and wagons over roads deep in mud or made of fallen logs. Her tuberculosis persisted and often she shivered and burned with the chills and fever of malaria. But neither hardships nor illness could hold back this woman whose sense of duty forced her frail body to endure all discomforts and suffering for the sake of those whose suffering was greater. State after state she memorialized. Public sentiment altered under her disclosures. In each state she remained to see funds appropriated and ground broken for the buildings to shelter the in-

sane. Then only did she move on. In nearly every instance the state legislatures voted to name the new institutions after Miss Dix, but with one exception she steadfastly refused to accept this recognition. The Dixmont Hospital of Pennsylvania is the only one which marks the progress of the enlightenment that she carried to the people of the United States.



A CARICATURE ON MECHANOTHERAPY

Gymnastics for therapeutic purposes were introduced as "Swedish movements" about 1830, and from them arose such methods as that of mechanotherapy used successfully in treating nervous and mental disorders. The idea of a lady, by doctor's orders, sawing wood or swinging clubs for the sake of her "nerves" once aroused much derision.

Next she attempted to obtain an appropriation from the Federal Government to aid in the support of the state institutions. The House and Senate approved, but President Pierce vetoed the bill. Exhausted from this struggle, she sought rest in the British Isles, but was no sooner there than she saw the need for further work. Her disclosures in Scotland led to the prompt appointment of a

Royal Commission empowered to correct the abuses in the institutions of that country. A year on the Continent and then she came home again, working incessantly for new asylums and the better maintenance of those already erected.

In 1861 she was called to organize the nursing staff of the Union Army. To that date the material aspects of her work totaled the founding of thirty-two asylums. As a result of her efforts she had obtained for the support of her humanitarian work probably the largest sum of money ever raised by anyone for a strictly benevolent purpose.

However striking those achievements may seem, they are far outweighed by another aspect of her work. She made the people of America a more humane people. That alone is sufficient cause to bestow upon her the title—"The most useful and distinguished woman that America has yet produced."

Part Four

THE GREAT MORTALITIES

CHAPTER THIRTEEN

THE FIRST AMERICAN DISEASE



QUITE recently a new infectious disease has been discovered in this country. It has the distinction of being the first truly American disease. It was discovered by the United States Public Health Service and nearly all of the knowledge concerning it has been elucidated by the physicians of that splendid organization. They also named it; they called it *tularemia*.

That's a curious name, isn't it? But it wasn't just a word coined at random. It has a history that bears directly upon the discovery of the disease. The English poet Coleridge, author of the "Ancient Mariner," said that we might often derive more useful knowledge from the history of a word than from the history of a campaign. In your own branch of endeavor you know of many instances proving this point. But I can illustrate it only with medical terms; and certainly many of them have most curious derivations that throw light on ancient beliefs and customs.

Words survive, but their meanings change, so that many of the words in use today have for us a significance remote from their original meaning. You see a transition of this kind—indeed, almost a transformation—in the word idiot. Many, many centuries ago the little country of Greece was a nation of politicians. The ideal of nearly every citizen was to serve in official capacity and hold office. But there were some few men among them who frankly admitted that they cared nothing for political eminence; they preferred to live, as most of us do, as private citizens. To distinguish them from the office-seekers they were called *idiotai*. It came about in time that their modest tastes and retiring habits were attributed to degraded intellect. The word gradually took on the significance

of low intelligence. In other words, the *idiotai*, the *idiots* of those days, were men content with private life.

Then there is the word *artery*; we use it to designate the vessels through which the heart pumps blood, but the Greeks and Romans thought that they contained air, and so named them *air tubes*, or *arteries*; we retain the name even though we know these vessels have no air in them.

The *melan* of *melancholy* comes from *melos*, which meant *black*, and the *choly* from *chole* which meant *bile*. *Melancholy* was *black bile*; a secretion from the liver which affected the mind and disposition. There was a beautiful remedy, *kalos*, for this blackness, *melos*, *kalos melos* or *calomel*. There is another disturbance of the liver—this time a real one—called *jaundice*, in which the person affected turns a yellowish hue. The physician calls the condition *icterus*; in Greek, *ikteros* was a yellow bird.

The word *nightmare* has no reference at all to a galloping female quadruped; the mare is from Mara, the old Norse deity who was supposed to strangle people in their sleep. The expression *sardonic grin* arose from the old legend that told of a plant growing on the island of Sardinia which, when eaten, caused people to laugh so violently that they died.

In recalling the curious origin of medical terms I am led to wonder if people of some far-off future time will succeed in figuring out the reason why our first truly American disease, tularemia, was named after a bulrush. We are near enough to the origin now—the disease was named only a few years ago—so that we know the logical steps by which the apparently strange term came into being.

The name goes back to the time when California was a Spanish possession. In certain marshy places there grew a variety of bulrush called by the Spaniards and Mexicans *tule*. The areas where these reeds grew abundantly were named *tulares*. Years afterwards, when California had become a state in the Union one of its counties was given the name Tulare.

The story of the disease tularemia commences shortly after the San Francisco fire of 1906. Such catastrophes always imperil the sanitary measures of organized preventive medicine upon which the very existence of urban civilization depends. The supply of pure

A BRIEF
HISTORY
OF
EPIDEMIC AND PESTILENTIAL DISEASES;
WITH THE
PRINCIPAL PHENOMENA OF THE PHYSICAL
WORLD, WHICH PRECEDE AND AC-
COMPANY THEM,
AND
OBSERVATIONS DEDUCED FROM THE
FACTS STATED.
IN TWO VOLUMES.

By NOAH WEBSTER,

Author of *Dissertations on the English Language* and several other
Works—Member of the Connecticut Academy of Arts and Sciences
—of the Society for the Promotion of Agriculture, Arts and Man-
ufactures, in the State of New-York—of the American Academy
of Arts and Sciences, and corresponding Member of the Histori-
cal Society in Massachusetts.

V O L. I.

HARTFORD:

PRINTED BY HUDSON & GOODWIN.

1799.

[PUBLISHED ACCORDING TO ACT OF CONGRESS.]

A LEXICOPHAGER WRITES ON MEDICAL MATTERS

Title page of Webster's *History of Epidemic and Pestilential Diseases*. Noah Webster, who graduated from Yale in 1788, is better known as a lexicographer than a medical writer. He was, however, America's first epidemiologist. In 1796 he published *A Collection of Papers on the Subject of Bilious Fevers Prevalent in the United States for a few Years Past*, and in 1799 the two-volume work on epidemics of which the title page is represented here. Webster thought that cities were detrimental to health, and no doubt they were in his day, before sewers had come into use and when none of the sanitary regulations now an essential part of city life had been established. Here is his comment on a city of his time: "Away, then, with crowded cities—the thirty foot lots and alleys, the artificial reservoirs of filth, the hotbeds of atmospheric poison! Such are our cities—they are great prisons, built with immense labor to breed infection and hurry mankind prematurely to the grave."

water fails; the disposal of sewage is interfered with; fresh, wholesome food cannot be obtained; and the disorganized state of the people makes it impossible to detect and isolate those who have infectious diseases. Consequently, epidemics arise. In California, bubonic plague threatened. That, as you know, is a very terrible disease which still rages in the Far East, but which has been held under control in our country by the efforts of the city, state, and federal health services. If they discarded their vigilance and the disease became established here, we should in all probability have epidemics such as Europe had three hundred years ago, and as Manchuria still has. We should die by millions.

Consequently, even the slightest threat of bubonic plague was sufficient to bring the men of the United States Public Health Service to the scene. They began an active search for the disease in California. They did not spend their time waiting for the appearance of human cases to show the rise of the disease. They searched among the rats, for bubonic plague is primarily a disease of rats, although ground squirrels may acquire it also.

The disease is carried by the fleas which leave the dying rats, infest man, and inoculate him with the disease bacteria. Consequently, the men of the Public Health Service, under the direction of Dr. George McCoy, examined rats and squirrels for evidence of bubonic plague.

A great number of these animals were trapped or shot over a wide area. They were carefully labeled as to their source and brought to the laboratory. The workers there dissected the animals, searching for evidence of disease. If such was found, a portion of the organ involved was cut away and inoculated into a living guinea-pig. If the guinea-pig so treated remained healthy, this fact was evidence that no disease bacteria were present in the rats suspected of having the plague. If, however, the guinea-pigs died, then there was a strong probability that the rats were suffering from plague. But the men of the Public Health Service were not satisfied with mere probabilities, and so in such cases they carried their search farther. Diseased material taken from the guinea-pigs was put in broth and kept warm in an incubator until the bacteria present had multiplied to an enormous number. A small portion of the

broth was then examined under a microscope for the presence of the bacterium which causes plague, the pest bacillus.

It was at this stage of the work that a curious occurrence took place. Ground squirrels were brought to the laboratory having in their bodies diseased areas strongly suggesting plague infection. Guinea-pigs inoculated with this material died. But the pest bacillus could not be found. The disease was not bubonic plague. It was a new disease, but the bacteria causing it could not be isolated. So for want of a better name it was called "plague-like disease of rodents."

The search for its cause went on. Although the disease was apparently an insignificant infection of California ground squirrels, its cause must be found if possible, for there was always the danger that the disease might be one which would eventually extend to men or domestic animals. In this case, as subsequent events proved, the fear was justified.

Doctors McCoy and Chapin of the Public Health Service collected forty-six naturally infected ground squirrels which had been shot in nine different counties of California. A very exhaustive search was made to discover the bacterium responsible for the disease. But the organism could not be made to multiply on any of the ordinary media used by bacteriologists for cultivating bacteria. It was not until 1912 that success was finally attained. The bacterium was very particular about its diet, but it was eventually found to thrive on egg yolk. So grown, the bacterium turned out to be a very minute, rod-shaped organism. There was no question about the identification; when guinea-pigs were inoculated with it, they died of the plague-like disease.

At the time this discovery was made the investigators of the Public Health Service were working in Tulare County, and so they named the newly isolated disease organism bacterium tularense. This discovery was the first step in the history of tularemia.

The story shifts now from California to Ohio. An employee in a restaurant of Cincinnati, engaged in dressing rabbits, developed a very serious infection in his eye. The disease resembled none that was known. The man was sent to a hospital to receive every aid that medical science could provide. He came under the attention

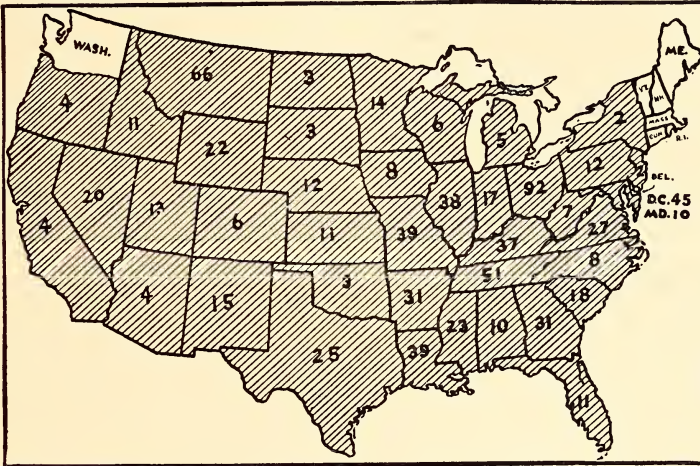
of Professor William Wherry of the University of Cincinnati. He, with one of his students, W. B. Lamb, took some of the matter from the man's eye and inoculated guinea-pigs with it. The animals died, but the bacteria causing their death could not be found by the methods ordinarily used in isolating bacteria. And then just at that time Dr. Wherry learned of the work that had been carried out in California by McCoy and Chapin. He used the egg-yolk media that they had employed. He found in the eye of the patient the bacterium *tularensis* which caused the plague-like disease of rodents. The organism could affect men. The fact that the bacterium *tularensis* can produce a serious infection in the eye of man was the second step in the history of the disease tularemia.

In his search to discover the source from which this restaurant employee had been infected, Dr. Wherry succeeded in isolating the bacteria from two wild cotton-tail rabbits found dead in southern Indiana. He published the first warning of the danger of the transmission of bacterium *tularensis* from wild rabbits to man. Hunters, he pointed out, should particularly avoid handling wild rabbits found dead in the field; wild rabbits easily caught by a dog or which are sluggish in their movements are very apt to be infected.

The scene of action next moved to Utah. In some districts of that state there was prevalent among ranchers and farmers a disease known as deer-fly fever. In 1919 Dr. Edward Francis of the United States Public Health Service undertook the investigation of this disease. He went to the vicinity of the town of Delta, Utah, where a ranchman was ill with the disease following the bite of a deer fly. An ulcer had developed at the point on his neck where the fly had bitten him; the glands about his head and neck were swollen; he had a high fever. Dr. Francis took a little of the man's blood and with it inoculated two guinea-pigs and two rabbits. They developed the plague-like disease of rodents and died; the bacterium *tularensis* was isolated from their bodies. The ranchman died on the twenty-sixth day of his illness. The bacterium *tularensis* could produce not only a local infection in the eye from material carried there with the hands, but it could produce also a very serious general infection of the body when it was brought in through the skin

by biting insects. That discovery was the third step in the history of tularemia.

Dr. Francis while working in Utah suddenly became very ill. His symptoms were similar to those which the ranchman had exhibited. But he had not been bitten by a deer fly; he had acquired the new disease from merely handling the animals that he had inoculated with the blood from the ranchman. The bacterium could



MAP OF THE UNITED STATES SHOWING THE DISTRIBUTION OF
HUMAN CASES OF TULAREMIA

The figures indicate the number of cases reported from each state up to the year 1929.

penetrate the unbroken skin of the hands. And that fact marks the fourth step in the history of tularemia.

Seriously ill though he was, Dr. Francis nevertheless took his infected animals to Washington, stopping in Chicago long enough to transfer the disease to new guinea-pigs, so that the bacteria would survive. He delivered his guinea-pigs at the Hygienic Laboratory at Washington; then he went to the Emergency Hospital, where he remained as a patient for two months. He was one of fifteen public health workers to acquire the disease in the course of the investigations which have given us our knowledge of tularemia.

In 1920 Dr. Francis returned to Utah and continued his study

of deer-fly fever. He had yet to find out the source from which the deer flies obtained the bacterium *tularensis*. Finally he isolated the bacteria from wild jack rabbits. He found that deer-fly fever, or, as we call it now, tularemia, resulted when the flies bit infected rabbits and then subsequently bit men and inoculated them with the bacteria from the rabbit.

The description of the new disease furnished by Dr. Francis led to the discovery of many cases throughout the country which otherwise could not have been diagnosed correctly and would have been mistaken for blood poisoning or severe cases of influenza. The disease known as rabbit fever, which occurs among marketmen and sometimes among hunters, was found to be due to infection by the bacterium *tularensis*. More than eight hundred cases of the disease, with a mortality of nearly four per cent, have occurred in the last few years. The wide distribution of the infection is indicated by the fact that these cases have been reported from every state except the New England States, Delaware, and the state of Washington. The disease has quite recently been discovered also in Japan and Russia.

The work of Dr. Francis showed these facts about the disease: Domesticated rabbits raised for food or as pets are not infected, although they are susceptible to the disease. Infected wild rabbits may be eaten without harm if they are thoroughly cooked. The greatest danger comes from skinning and dressing wild rabbits. Among the rabbits the disease is transmitted by the bite of blood-sucking flies and ticks. The disease is spreading rapidly, and it is possible that it may be transmitted to sheep by the bite of ticks. If such is the case, tularemia may eventually attain economic importance in that direction.

It was Dr. Francis who gave the name tularemia to the disease. The prefix of this word is derived from the name of the bacterium causing it, *tularensis*; the suffix *emia* means blood, as in *anemia* and *septicemia*. He found that the bacteria spread in the blood throughout the body, causing a general infection.

CHAPTER FOURTEEN

THE CANINE MADNESS



OBITUARY notices are not very entertaining literature as a rule, but here is one that has the advantage of showing an unusual but not unique transfer of a once dreaded disease and at the same time of throwing light on the kind of home medical treatment that was practiced in the early days of this country. The notice appeared in the newspaper called the *Connecticut Courant*, published at Hartford. It is under the date of April 23, 1797, and reads:

Died at Southington, on Sunday the 15th instant, Levi Woodruff, aged 43. The progress and origin of his disorder will probably be thought worthy of being recorded.

He felt himself considerably indisposed on Thursday. . . . On Friday he was abroad. At evening, feeling his indisposition increasing, a physician was called in. From a slight degree of hydrophobia the physician was alarmed with an apprehension of canine madness; but having never heard, through a near neighbor, of the patient having been exposed to be bitten, he suggested nothing, at that time, of his fears. On the morning of Saturday he saw him again, and, observing an increase of the same symptom, suggested the idea to the family. It was recollected by them, that for a length of time, the patient had trained a small dog belonging to the neighboring family, to lick an ulcerated sore within his ear, for the benefit towards its cure; that four weeks previous to that time the dog was put to licking the sore; that the operation was more than commonly painful, and that a small breach was made in the skin of the ear by the tongue of the dog; that the next day the dog was affected with symptoms of madness, and the day following was killed. No apprehensions of mischief were entertained at that time, nor had it been thought of after. The physician was soon convinced that the disorder must have proceeded from the virus infused into the sore by the dog. . . . Through the whole of Saturday he was constantly craving water; but was thrown into the most violent agitations upon the sight of it. . . .

OBSERVATIONS
ON
HYDROPHOBIA,

**PRODUCED BY THE BITE OF A MAD DOG, OR OTHER RABID
ANIMAL.**

WITH
AN EXAMINATION

OF THE
VARIOUS THEORIES AND METHODS OF CURE, EXISTING AT
THE PRESENT DAY; AND AN INQUIRY INTO THE
MERIT OF SPECIFIC REMEDIES.

ALSO,
A Method of Treatment best adapted to the Brute Creation.

IN A SERIES OF LETTERS ADDRESSED TO A FRIEND.

BY JAMES THACHER, M.D.

Fellow of the American Academy of Arts and Sciences, and of the Massachusetts Medical Society, and
honorary Member of the Georgia Medical Society

*"So bends tormented Tantalus to drink,
"While from his lips the reflux waters shrink;
"Again the rising stream his bosom laves,
"And thirst consumes him, mid circumfluent waves."
DARWIN'S Botanic Garden.*

PUBLISHED BY JOSEPH AVERY,
And for sale at his Bookstore in
PLYMOUTH (Mass.)
1812.

A PHYSICIAN OF THE REVOLUTION WRITES ON RABIES

Title page of Dr. Thacher's observations on hydrophobia, published in 1812. The title page to Dr. Thacher's Military Journal is illustrated on page 141 and a brief biography given there. In his book on hydrophobia he recommends prompt cauterization of the wound made by the bite of the dog, a measure needed today as well as then, even though the addition of the Pasteur treatment now affords a most positive prevention against rabies. Dr. Thacher expresses great indignation at the thoughtlessness of people of his day in turning rabid dogs out into the streets rather than confining them. Sporadic cases of rabies occur every year in this country, but in 1785 and 1789 the disease assumed epidemic proportions. The British Isles, by means of the stringent quarantine of imported dogs, are kept free from rabies.

The newspaper item then goes on to describe with painful minuteness the gruesome details of Mr. Woodruff's inevitable demise, and concludes with a note of thankfulness on the thoughtfulness of the sufferer in refraining from biting any of his friends. I quote:

A circumstance peculiarly favorable to his friends and attendants, and to be remembered by them with gratitude, was this; that he showed no disposition, at any time, to do the smallest injury or mischief to any person.

I turn from this depressing, if illuminating item, to a more official one, a document from the State of New York given under the hand of Elisha Jenkins, comptroller. It reads:

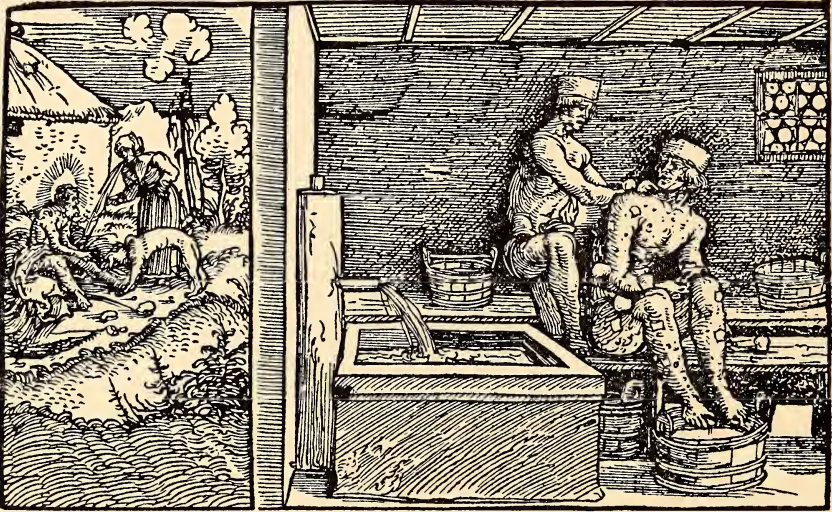
Pursuant to the directions of an act, entitled, "An act for granting a compensation to John M. Crous, for discovering and publishing a cure for the canine madness, passed the second day of February, 1806, I do hereby certify, the said John M. Crous has this day deposited in this office a certain writing, purporting to be the remedy used by him with certain success, for more than twenty years past, for the cure of hydrophobia or canine madness. . . ."

For his remedy, Mr. Crous was rewarded by the State of New York with \$1,000, a considerable sum in 1806. And what was the valuable remedy of Mr. Crous? I fear the laudable desire of the New York Legislature to spare the citizens from a frightful disease was stronger than the medical discretion of that body; the prescription calls for a mixture made from the pulverized jawbone of a dog, the ground-up false tongue of a newly foaled colt, and the green rust scraped off the surface of an English penny of the reign of George I.

I know nothing of Mr. Crous' political affiliations, but aside from any extraneous motives in the matter I feel certain that the Legislature sincerely would have gone to almost any length to free the people from the fear and danger of the disease hydrophobia, or rabies, which in those days brought an inevitable death and against which there was then no known prevention or cure. The situation we know had existed as long as there is written history, probably ever since the first man trained a dog to be a companion or a servant, and no doubt even before that, for rabid wolves and foxes will attack men and thus spread the disease. The last world report on rabies that I have seen, that for 1928, gave for that year the

number of known victims of bites from mad wolves, jackals, and hyenas as more than 2,000; in the same period the bites from rabid dogs, and not all are recorded, but only those treated, total well over 30,000.

Well-meaning but misguided legislative bodies have purchased other remedies quite as illogical as that bought by the state of New York; the English government once bought one consisting mainly of egg shells.



A DOG USED TO TREAT SORES

A group of lepers in the Middle Ages. One leper is having his sores bathed; another, seated by the roadside, represented as St. Lazarus, is allowing a dog to lick his sores, the same treatment that Mr. Levi Woodruff of Southington, Connecticut, used for an ulcerated ear in 1797, and from which he developed rabies.

When the New York Legislature spent its \$1,000 for a jaw bone, a false tongue, and corroded English penny, the situation concerning rabies was a tragic one. The disease was uncontrolled; the occasional mad dogs bit cats and sheep and cows and pigs and even children and adults. Many became rabid and died.

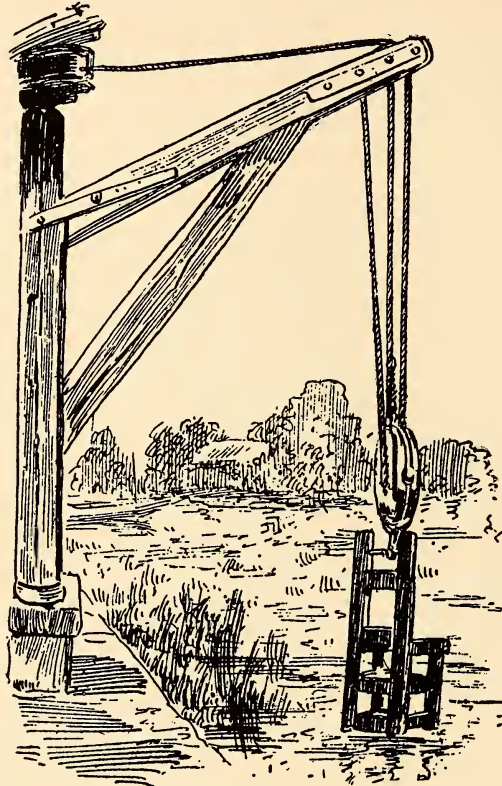
Dr. James Thacher, a physician prominent in the Revolutionary War, wrote a long book on the disease, published in Plymouth, Massachusetts, in 1812, detailing case after case of hydrophobia

in New England. Cases of children attacked by dogs and torn and mangled, of men and women whose pets had turned on them and bitten them, of stray cats that lay in ditches to dart out and claw and bite the farm children. Some who were bitten escaped the disease, but their mental suffering was great. They had to wait months, even a year, sometimes, to be sure that they were not affected, for the period between the bite and the disease is variable and occasionally amazingly long—usually three weeks to eight weeks, but sometimes as long as a year. There was no way of preventing the disease or of curing it (unless you subscribed to Dr. Crous's fantastic remedy). The outcome was invariably fatal. For that reason the disease struck fear into all men; there was not one chance of recovery for the sufferer.

These men of a hundred years ago knew much about rabies—almost as much as we do today except for one thing: we know how to prevent it; they did not. Dr. Thacher, when he wrote of hydrophobia in 1812, gave as good a description of rabies in dogs and cats, and even birds, as could anyone today. He described the two kinds of disease in dogs. He knew that the virus was carried in the saliva and transmitted to man and other animals by the bite of the animal or that it entered through open sores and cuts and scratches, as during the unfortunate medical experiment of Levi Woodruff, him of the sore ear and the trained dog.

The two kinds of rabies shown by dogs are the furious variety and the dumb variety. In neither does the dog go suddenly mad. The first change is one in disposition. The animal usually becomes gloomy and taciturn, occasionally very affectionate; generally it seeks to hide away in corners or under chairs. But even then it is uneasy, fidgety, and obviously ill, alternately lying down and then jumping up—unable to rest. The dog may try to lick everything about it, but as yet shows no propensity to bite. The restlessness increases, and fanciful and disturbing thoughts seem to cross its mind; it snaps at imaginary enemies and growls low and hoarse when there is nothing to growl about. The master's voice can still rouse it from its lethargy; it will come to be petted and eagerly spread its infected saliva over the hand that pats it. At this stage the dog barks with an altered voice so characteristic that veterina-

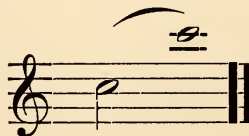
rians and others who are familiar with the condition can sometimes recognize madness from the sound. It is a croupy sort of cough



A DUCKING-STOOL

This machine was used most commonly for the punishment of witches and scolds, but was employed occasionally in the treatment of rabies. It was believed in olden times that hydrophobia could be overcome by immersing the patient in cold water. Pliny in his *Natural History* mentions this treatment.

or howl—likened by French veterinarians to the crow of a rooster and represented in the musical scale by this bar repeated.



No doubt the old superstition that death was impending when a dog howled dismally during the night had its basis in the fact that rabid animals barked in this way. In those days when rabies could not be prevented the howling was truly a presage of death.

The barking is the prelude to the furious stage. The dog, if allowed freedom, will run wild, its tail between its legs, its head down, eyes inflamed, jaws dripping saliva but not foaming at the mouth. Blindly it snaps and bites at anything in its way, a tree, a



A MAD DOG IN THE DINING-ROOM

From a drawing by Rowlandson, a scene of the late eighteenth century.

cat, a horse, a man, or a child. Finally, after hours and hours of aimless wandering perhaps over long distances, the dog weakens. It slinks into a corner or a ditch. It becomes paralyzed and dies. But in the path of its journey it has spread the virus of its disease to all whom it has bitten.

In the other type of rabies, called dumb rabies, the animal, instead of dashing about, snapping and biting, stays quietly at home. It has a dull, sad expression in its eyes; it loses its voice; its jaws become paralyzed, and its lower jaw hangs down. It appears as if it had something stuck in its throat. Usually it cannot bite, but the danger comes from thrusting the fingers into the animal's mouth with intention to remove the substance believed to be lodged there.

Any scratch upon the hand is an opening through which the virus in the saliva may enter. Sympathy with afflicted animals we can all appreciate, but *beware of the dog that seems to have a bone in its throat*. It's time then to call the veterinarian.

Contrary to popular belief, dogs with rabies are not afraid of water; they drink eagerly until they are no longer able to swallow. Men with rabies, however, do show hydrophobia—the fear of water. They are thirsty, but each time they try to swallow their throat closes with a painful spasm. Even the sight of water may thus add to their suffering. This symptom was the basis for an ancient remedy for the disease, much worse than that of Dr. Crous's. It was to put the victim in water and keep on dipping him until he was unconscious, for it was believed that if the fear of water could be overcome forcibly, the disease would be cured. Many such pitiful scenes are set forth in old literature—the villagers gathered round the dipping-pool while some poor child in the convulsions of the disease is taken from its parents' arms and dipped and dipped in the cold water. It was a cruel and futile effort to cure a disease which even today, with all the resources of modern medicine, cannot be arrested or cured once it has developed. But it can be prevented.

Even when Dr. Thacher in our post-Colonial days wrote on hydrophobia, he offered two important steps toward the control of the disease, both of which are needed today as much as they were then. But the final step, the one that gives us assurance of prevention, did not come until Pasteur's work in 1885. The early recommendations were: first, do not kill a dog suspected of rabies; lock it up tightly where it can reach no one, or, better still, have the veterinarian take charge of it. Wait, then, and see whether the dog dies. If it lives for a week, there is no danger of rabies, for a dog or any other animal never survives the disease. If the dog lives, weeks and months of uncertainty and anxiety are averted by the knowledge that there is no fear of rabies. In Dr. Thacher's day, if the dog was killed, one never knew whether or not it had rabies; nowadays, however, even if the dog is inadvertently killed, it is still possible to detect the disease from changes in the dog's brain, which is marked by little bodies visible under the microscope. This

important diagnostic measure was discovered by Dr. Negri in 1903 and the bodies named for him. Today, if the dog suspected of rabies is killed, it is sent at once to the state laboratory for exact diagnosis.

The other measure recommended in bygone days was immediate and thorough cauterization by the physician of the wound infected with the dog's saliva. That measure is as desirable today as it was before the Pasteur preventive treatment came into use. Cauteriza-



A MAD DOG IN THE COFFEE-HOUSE

From a drawing by Rowlandson.

tion, together with the Pasteur treatment, offers the maximum protection against the disease.

The story of the development of the preventive measure brought into effect by Louis Pasteur and his assistants, Chamberland and Roux, is one of the most thrilling chapters in all medical history. It can be followed step by step in Pasteur's reports of the progress of his work made to the French Academy of Science during the years 1881 to 1885.

In the first communication he describes the experiments by which he confirmed the fact that the virus of rabies is found in the saliva

of rabid animals. He then raises the question of where else it is to be found in the animal. And he answers that: in the brain, spinal cord, and nerves. The virus in the saliva allows the transmission of the disease; acting on the brain it drives the dog mad and incites it to bite. It would appear almost as if the virus had reasoned out



PASTEUR'S BIRTHPLACE

Louis Pasteur was born at Dôle, Jura, December 27, 1822, and died near St. Cloud on September 28, 1895. He was a devout Catholic, a man of simple tastes, and one of the greatest of human benefactors.

this cruel method of assuring its own survival at the expense of men and animals.

Rabies, Pasteur showed, contrary to popular belief, has nothing to do with the weather, the sun, the dog star, or shortage of water. It is an infectious disease occurring at all seasons of the year. The virus, when inoculated into the body, travels through the nerves to the brain. The slowness of its journey through the nerves accounts

for the variable period at which the disease develops after the bite. It takes weeks or even months to come to the brain, and in its course it does not disturb the function of the nerves in which it moves.

Later communications from Pasteur, those of the year 1884, tell how he was able to produce rabies in animals experimentally by putting the virus in the brain itself. The disease then always developed in a short time. Next he tells how he turned to the idea of making a vaccine, a weakened or killed strain of the virus that could be used to produce an immunity to rabies. He had been successful in such vaccines against the sheep-disease, anthrax, and against the cholera of chickens.

He found that he could weaken the virus of rabies by passing it through a succession of animals and weaken it still further by drying the nervous tissue containing it. Then he came to the decisive question, would injection of the weakened virus into an animal prevent it from acquiring rabies? He tried the experiment. Dogs were injected repeatedly with the weakened virus, each injection made stronger until he was satisfied that the animals could resist infection. Then together with them he put an equal number of dogs unprotected by vaccination. A frantically mad dog was turned loose among the group. All were bitten. The unprotected dogs developed rabies; the ones vaccinated did not.

Then Pasteur felt justified in offering publicly his method of protecting dogs against rabies; according to his ideas all dogs were to be inoculated and thus protected; rabies would then disappear. But there were difficulties in the way. There were stray dogs that could not be caught and protected, and there were wolves in France harboring rabies. It was not a practical measure. Matters were at an impasse, for Pasteur had not then thought of applying his method to men already bitten.

And then there came the incident of little Joseph Meister. He and his mother came from Alsace to Pasteur's laboratory to ask for help. The nine-year-old boy had been horribly bitten in fourteen places by a rabid dog. He was exposed to almost certain death. What should Pasteur do? Dare he try his vaccine on the boy? Physicians were called in consultation, for Pasteur was a chemist, not a physician. They recommended the attempt, for the boy was

doomed otherwise. And so on July 6, 1885, at eight o'clock in the evening, sixty hours after the bite, the first injection was made. Each day thereafter until July 16th Joseph received injections of increasing strength. On that last day Pasteur did his supreme experi-



AUSTRIAN CARICATURE OF PASTEUR

Pasteur declined the proffered honor of the Prussian Cross of Merit for his researches, and in consequence was accused by a Viennese journal of cultivating an exaggerated nationalism. He is represented in the caricature as inoculating himself with "*chauvinismus*" the term applied to Napoleonic nationalistic policies.

ment. He injected the purest and the strongest virus of rabies he could obtain—a virus that would kill an unprotected man. But little Joseph Meister was protected. The treatment had worked more rapidly than the virus from the bite of the dog could travel up his nerves. Rabies had been prevented.

Soon there was another patient, Jean Baptiste Jupille, a shepherd boy who, seeing a mad dog throw itself upon a group of six young children, had taken his whip and rushed to their aid. The dog seized his hand. The boy threw the animal to the ground, forced open its mouth to release his mangled hand, and, although repeatedly bitten by the furious animal, nevertheless he held the dog while he tied its mouth shut with his whipcord and then beat it to death with his wooden shoe.

Jean Baptiste was treated by Pasteur. He lived. And if today you visit Paris, you may see in the yard of the Pasteur Institute the statue showing this shepherd boy struggling with the mad dog. It is more than a monument to his heroism; it marks the year when the dread of rabies was removed from mankind; a means of preventing it had been found. In the closing years of the nineteenth century thousands of patients bitten by mad dogs and wolves from as far away as this country and Russia journeyed to the Pasteur Institute of Paris for the life-saving measure. Now the treatment may be had in any country of the world.

I mentioned the 30,000 and more instances of people bitten by rabid animals each year. And how many get rabies? About 0.3 of one per cent of them, and they are those who have delayed too long in getting treatment. Today no one need have rabies.

CHAPTER FIFTEEN

THE WINDOW TAX



IN THE history of England there are records of four mysterious Black Assizes, court sessions during which a disease, a fatal fever, stole like a noisome vapor from the foul dungeons of the prison to sicken and kill the prisoner at the bar, his judges, the jury, and the spectators, alike. Three of these Black Assizes were in the sixteenth century—one at Cambridge, one at Oxford, and one at Exeter. The fourth was in the eighteenth century, at London.

In April, 1750, the Old Bailey court sessions were under way. Sir Thomas Abney in robe and wig presided at the bar; the Lord Mayor of London sat near him, as did also many famous judges and lawyers, for the case was one that attracted much attention. The prisoner, a Mr. Clark, was brought to the dock. As the doors opened to admit him from Newgate prison, a foul odor assailed those in the court-room. The men near the prisoner drew back, for the fetor of the crowded jail clung to him. But there was little space to move in; the court-room was crowded with spectators; the continual pressure from the influx of new arrivals pushed forward those in front until they were forced close to the prisoner.

The trial proceeded and was concluded without untoward event. But a week later the Lord Mayor, three judges, eight jurors, and forty clerks and spectators had sickened and died of fever. All of these men had been seated on the left side of the court-room and all in a group near the prisoner.

The disease that affected them was then called jail fever, ship fever, or camp fever; nowadays we call it typhus fever. Can you wonder that men of two centuries ago thought it a mysterious disease when you consider that no one in the families of these fifty-

two men who died after the Black Assizes contracted the disease? Surely, they thought, it must be engendered by bad air and foul smells. And yet they knew that under certain conditions it spread through whole armies and towns. Across those dark pages of history



A WINDMILL ON NEWGATE PRISON

This ventilating system was installed in 1752 under the direction of Dr. John Pringle and the Reverend Stephen Hales. Pringle was a great military surgeon, much interested in the organization of hospitals; Hales experimented in physiology and was the first man to measure the pressure of the blood in the arteries. The windmill ventilator did not rid Newgate prison of typhus fever.

which tell of the grievous visitations to man by war, famine, misery, and squalor there was written always the story of typhus fever. The great Castilian army at the siege of Granada was decimated by typhus in 1489; the Spaniards called it "the cloak," or *tabordillo*. In the seventeenth century, when Europe was in the throes of the Thirty

Years' War, towns and armies fell before typhus. These things the men of the eighteenth century knew: war and famine brought in their wake camp fever—typhus.

If they could have looked ahead, they would have seen the same disease spread by Napoleon's army over France and Italy; seen it among the "famine fevers" that swept Ireland in 1846, and spread by Irish emigration in that year to American cities. They would have seen it stalk among the armies of the Crimean War and strike a hundred thousand Russian troops in the Turkish War of 1878. They would have seen it settle down to take a steady toll of death year in and year out in the slums of Mexico and Poland. They would have seen it rage wildly in the great Serbian epidemic during the World War. But in that war they would have seen also something never known before in war time—typhus held in check. The ruined cities of Belgium, the troops in the trenches, the prisoners of war, were not devastated by typhus fever, for in the first decade of the twentieth century means for controlling it had been discovered.

Those men back in 1750, who knew that camp fever always came with their wars, wondered why it festered at that time in their jails and spread from there to kill their judges and juries. There was no war or famine in England to breed the disease. But it had smoldered on in the slums and ships and jails for fifty years and was to go on for another fifty before the cause was removed. Perhaps if the disease had remained limited, as it usually was, to the dregs of the slums, to men forcibly drafted into the navy, and to the prisoners in the jail, public sentiment would not have been aroused. What happened to such men, I fear, did not trouble the public conscience much in those days; but if the disease was to make the courts unsafe for judges and juries, that was another matter entirely, one that needed immediate attention. And so, for the first time, interest turned to the ventilation of jails in an attempt to get rid of the foul odor that was believed to be the cause of the disease.

The preacher and physiologist, Stephen Hales, the first man to measure the blood pressure, with Dr. John Pringle tried to ventilate Newgate prison. For reasons concerned with taxation, as we shall

see in a moment, they did not do what one would naturally expect, put in windows to let in both air and sunshine. Instead they built air ducts from every cell, all leading to a chimney on the roof, and over this outlet they put a fan operated by an enormous windmill. The fan sucked the foul air out of the dark cells, but the prevalence of typhus was unabated. Ventilation alone did not control typhus fever.

Yet in a way, legislation against ventilation was responsible for the outbreak of typhus fever that in the eighteenth century spread through the slums, the navy, and the jails of England and came at the time of the Black Assize into the court-room. The English epidemic of the eighteenth century is a picture of dull and sordid misery rather than one of great emotional appeal. I could have made this story of typhus fever much more graphic if, instead of choosing the epidemic in the slums, I had described its ravages during the turmoil of war, in the prison camps, or among the refugees of war-ridden countries, or its grim part in great national famines. Scenes of pathos and misery, heartrending even in the retelling, are found there. But my story has this advantage in the telling; it shows how legislation, poorly designed, affected by devious ways the health and lives of citizens. And similar legislation would do the same thing today.

The principles of public-health requirements, although far from being as well recognized even now as they should be, have progressed so far in our common knowledge that it seems to us almost incredible that any government could have put a tax on fresh air and sunshine. But that is exactly what the English government did with its window tax of 1696. The typhus epidemic grew out of that tax, and the tax, in turn, grew out of the failure of the government to put a milled edge on its silver coins. It seems a rather long stretch of the imagination to go from debased coinage to an epidemic of typhus fever. But here are the facts.

Prior to the latter part of the seventeenth century English coins were made by hand. A piece of flat metal snipped roughly into shape with a pair of shears was beaten into a coin with a die and hammer. The coins were not all the same size or thickness, and the edges were not protected against defacement by a milled design.

These coins offered a great opportunity for clipping, and the practice grew in spite of the severest penalties enacted against it. At every session in Old Bailey terrible examples were made of those who impoverished the English coinage and enriched themselves by the simple process of clipping pieces of metal from the edges of the coins, exchanging these mutilated ones for others less damaged and repeating the procedure until wealth brought suspicion upon them. Branding and hanging were of no avail as deterrents against the practice. The profits were enormous, and for every clipper hanged there were a dozen more to take his place. The English coins shrank perceptibly; recoinage meant only a greater profit for the clippers.

Moral suasion failed to curb the practice, but the more insistent pressure of economics brought the situation to a climax. The manufacturer was willing to pay his employees in clipped coins, but after a time he refused to accept them back for his wares except at the weighed value of the silver. The workingman had not objected seriously to the practice of clipping; it was a popular crime, and even he perhaps had indulged in it occasionally when times were hard. That is, he didn't object to clipping as long as his clipped shillings were worth their full twelvepence, but when he found their buying power only half that sum and diminishing rapidly as the clipping went on, he protested vigorously.

Forced to act, the government recalled the old coins. A new milled coin was made with a minting machine operated by a horse that walked round and round like that of the ancient grist mill. But the clipping had entailed an enormous shrinkage in the amount of metal. It was necessary to increase the supply. Reinstatement of the old hearth tax was suggested, a tax on every fireplace in the house. But the people objected; they remembered too well the "chimney men" who had invaded their homes to count the hearths and had seized upon their furniture when the money for the tax could not be found. And so, as a compromise, a tax was imposed on windows; they could be counted without invading the home. A fixed sum was assessed for each window and each skylight. In the jail the jailer was forced to pay the tax, for in those days running a jail was a concession—and a profitable one.

From the new tax there followed a period when skylights were roofed over and windows bricked in. Great tenements stood with scarcely a window opening, and some jails there were with none. The English poor crowded into rooms where sunlight never came, and the criminals and bankrupts, for those were the days when debtors were put into prison, were crowded into foul, damp cells.



TAX COLLECTORS

A caricature by Gillray showing the collectors going from house to house, as did the "chimney men," who collected the hearth tax.

In previous centuries typhus had, at times, existed in the slums and prisons, but in the seventeenth century, with improvements in living conditions, the disease had nearly died out. In the eighteenth century, in an effort to escape the window tax, the slums were reduced to squalor. Typhus rose again, for the disease thrives among a people who are crowded and dirty; and damp, dark rooms are ideal for its spread. Thus typhus sprang up in the tenements and from them it spread to the prisons. Released prisoners were im-

pressed into the navy, carrying with them their disease, to infest the quarters of the ships. But only rarely did it spread from the poor men to the well-to-do, as in the Black Assize of 1750. Even then it did not extend to the families of these men in the homes where they were treated.

The physicians of those days classed typhus as a form of typhoid fever. It was not until 1837 that an American physician of Philadelphia, William Wood Gerhard, demonstrated that typhus and typhoid fevers are entirely different diseases. Typhoid fever is an infection primarily of the digestive tract, caused by a specific bacillus that attacks the walls of the small intestine. It is acquired by eating food or drinking water contaminated with typhoid bacilli. The prevalence of typhoid fever in any community is an index of the state of the city's sanitary control over the water and food supply and sewage disposal, general civic matters. But typhus fever is an index of the personal cleanliness of the citizens. For we know now, although the information was not gained until 1909, that typhus fever is not transmitted by contaminated food or water nor by evil smells or filth, nor yet by actual contact of the sick with the well. It is transmitted by an insect, the body louse.

Now, from that knowledge it is clear why the window tax which caused the bricking up of windows led to the epidemic of typhus in the English slums and prisons, why only those men near the prisoner at the Black Assize came down with the disease, and why their families did not acquire it. The lice that spread the disease live in the seams of clothing and only come from there to feed or to find new hosts. So if clothing is not washed or hung in the sunshine, but kept instead in damp, dark rooms, the insects thrive amazingly. They spread from person to person in the crowded quarters. One case of typhus fever brought into a slum of such condition may start a persistent epidemic. It is only when sunlight and fresh air are let into the rooms and the tidiness of advancing civilization does away with squalor, that the disease dies out.

You can almost see what was happening during the Black Assize of 1750. The prisoner, infested with vermin and infected with typhus, sat in the crowded court-room. While those about him sniffed and commented on the vile odor from the prisoner, they

ignored the vermin that left him and crawled over those about him, carrying the organism of typhus and implanting it upon those they bit. But the homes from which the judges and jurors came were



THE PRESS GANG

A caricature by Gillray. Until the beginning of the nineteenth century naval parties, called "press gangs," forcibly seized or "impressed" men for service in the British fleet. From medieval times the crown had claimed this power. The need of men to man the fleet became so great in the time of Elizabeth that a Vagrancy Act was passed rendering all "disreputable persons" liable to impressment. On demand, sheriffs and mayors were required to produce the men for the press gangs; the officials emptied the jails on these occasions. The convicts carried the typhus fever from the prisons to the ships. The press gangs ceased their activities in 1815. Insistence upon the right to press British subjects in America was one of the chief causes of the War of 1812.

clean and orderly; vermin did not thrive there, and so their families did not acquire the disease.

The medical knowledge that tells us how typhus is carried came none too soon for the World War, only five years before its out-

break. But it was time enough to check the fever. Typhus did not add to the horrors of trench warfare nor did it ravage the Western prison camps. It was the first European war free from the disease. But typhus was ready to rise; you recall the terrible outbreak in Serbia. The means of transmission were there in the trenches, also, although the efforts of the medical corps kept the vermin at the lowest level possible. The men in the crowded trenches, you remember, called the vermin "cooties." Every condition for a horrible outbreak was at hand, an outbreak that might have decimated the armies. But typhus was held out. Great delousing stations were established; they were places where a thorough bath and sterilization of the clothing rid the soldier of vermin. These stations were not for the comfort of troops. They were to prevent the spread of typhus fever from the East into the West. It is a rather dreadful thought to picture what might have happened if the medical knowledge of how typhus fever is transmitted had not come for another decade.

Typhus still exists in the world. It always will exist until the war and famine that make for refugees are no more, until crowded, filthy prisons and dark, vile slums have given way before the tidiness and cleanliness of a civilization that believes in open windows, sunshine, and fresh air.

CHAPTER SIXTEEN

THE BLACK DEATH



ABOUT the time of the American War of Independence, Edward Gibbon, the English historian, wrote his famous book, *The Decline and Fall of the Roman Empire*. In it he made this statement: "If a man were called upon to fix the period in the history of the world during which the conditions of the human race were most happy and prosperous, he would, without hesitation, name that which has elapsed from the death of Domitian to the accession of Commodus." The period that he defined is from 96 to 180 A.D. and the place is Rome. The expression "happy and prosperous" naturally brings to mind the word healthy, for without health there can be no happiness or prosperity. To that end let us consider for a moment some of the medical aspects of these times upon which Gibbon looked with such favor. In the years 68 and 79 A.D. outbursts of bubonic plague occurred at Rome. The disease raged again in 125 and 164 A.D., and after the later date continued without interruption for sixteen years. This period which Gibbon regarded with envy commenced with a plague which at its height killed ten thousand persons in a single day. Tacitus, the Roman historian, who saw these events, says: "The houses were filled with dead bodies and the streets with funerals." The period closed with sixteen years of plague of such severity that it threatened to exterminate the Roman army. In this same "happy and prosperous" time malaria spread through Italy. Under its demoralizing effects the population of the countryside deserted their fields and flowed into the cities to swell the slums. After three centuries of malaria, Rome was pillaged by the barbarian tribes from the forests of Germany. Malaria and

plague were as much its conquerors as were these Goths and Vandals.

Viewed in the light of modern conditions, Gibbon's statement of the happiness of this period is almost as paradoxical as a remark that Herodotus made about ancient Egypt, which, he said, "was the healthiest country and filled with physicians." But the presence



A FIFTEENTH-CENTURY BATH SCENE

This group, much like the young people in Boccaccio's *Decameron*, are taking their leisure in the country. Everything is provided for their pleasure—the laden table and the musicians—and for their health: the bath in the foreground, the bleeding on the left, and the Jewish physician examining urine on the right. At that date services of the Jewish physician were prohibited to Christians but, because of the ability of these men, prohibition was often disregarded by the nobility and the wealthy.

of bubonic plague in Rome did not influence the views of Gibbon, because in the years between the Roman times and his own the historian had seen devastations of the plague which far exceeded any that the Romans had suffered. At the time that Gibbon wrote, Europe was just emerging from four centuries of the plague. This disease, which is now banished from western countries, was once regarded as an inevitable affliction of mankind.

It is unfortunate that the historian Gibbon could not look ahead instead of only at his time and backwards. If he could have seen our times, held secure from the plague, he would have for that reason alone, if for no other, applied to them that statement that he did to the Roman days—"the period in the history of the world during which the conditions of the human race were most happy and prosperous."

In the past the plague swept over a defenseless world in great recurring epidemics that left death and ruin in their train. For a few centuries after the fall of the Western Roman Empire the great epidemics subsided, since for a time travel ceased; without travel and commerce the disease could not be spread. Finally the Empire rose again; this time in the East, with Constantinople as its capital. Justinian, the lawgiver, was the Emperor. Peace and travel prevailed. Then began a series of those calamities in which the superstitious saw omens and warnings of the Divine wrath which was to culminate in the plague. An earthquake destroyed in a few minutes the city of Antioch, and twenty-five thousand people were buried in the ruins. A comet appeared. The sun was darkened for a whole year. A famine occurred in Italy and a multitude was starved. After these preliminaries the plague broke out in lower Egypt. It spread slowly up the Nile; it crept into Asia Minor. It reached Constantinople; there at its height it killed five to ten thousand inhabitants daily.

In its relentless advance the plague extended over Greece and into Italy. It entered Gaul and reached the Rhine. For fifteen years it went forward; then it slowly receded. On its way back it struck again at Constantinople. This time its devastation exceeded the means available for disposing of the dead, until finally the towers of the walls of the city were unroofed, the space thus exposed crammed with bodies. The roofs were then replaced.

For the next eight hundred years there were no further epidemics of the plague in Europe. The disease lay dormant while civilization spread westward. Charlemagne built his empire. Jerusalem fell to the Mohammedans. The Holy Crusades started and continued for two centuries. Dante wrote his immortal works. Still the plague lay replete from its harvest of the sixth century. Then the city of



THE PLAGUE VICTIM

From an old German wood-cut, probably of the fifteenth century. The physician is holding a sponge soaked in aromatic vinegar before his nose, and his assistant is keeping his nose shut with his fingers. It was commonly believed then that the plague was transmitted by breathing foul emanations from those afflicted with the disease. At a later date the physicians sometimes wore elaborate costumes with face-pieces filled with aromatics. The English judges, when taking their seats at the bench, carried a small bouquet, a survival from the times when, as a protection against pestilence, they carried a bunch of herbs. The patient shown in this illustration is without a nightgown; this form of apparel was not in use until a much later date.

Lübeck appointed a municipal physician; this first non-theological health officer of Europe earned his fee of four dollars a year without interference from the plague. In 1336 the Hundred Years' War started, and in 1345 the first apothecary shop was opened in London. That same year the bubonic plague was epidemic in Africa and Asia. Two years later it appeared in Constantinople and soon afterwards in Greece and Italy. Slowly but inevitably it spread through Europe. This epidemic, which lasted for the next three hundred years, was called the Black Death. It killed one-fourth of the population of the entire world.

As the plague spread across Europe, panic and confusion followed in its train. All restrictions of morality, decency, and humanity broke down before it. Parents deserted their infant children, leaving them in the houses while they dashed away to join companies in ships, only to find that at sea the plague was in the boats. Entire crews perished there, leaving derelicts manned only by corpses. Others hid in churches and gave themselves up to prayer or joined in holy pilgrimages to Rome, from which only one in ten ever returned. Bands of robbers, taking advantage of the demoralization, pillaged the houses, killing the sick and robbing the dead, only in turn to die with their booty in their hands. Some men and women followed that ancient precedent set by the inhabitants of Jerusalem when attacked by Sennacherib, which was embodied in the words: "Let us eat and drink, for tomorrow we die." They retired to country estates and gave themselves over to debauchery. The tales in Boccaccio's *Decameron* are of a merry group of young people who were thus in seclusion during the plague in Florence in 1348. That novelist lived through the epidemic and saw it at first hand. I wonder how many people who have read his tales have read also the introduction to the book, which says:

Such was the cruelty of Heaven and perhaps of men that, between March and July following, it is supposed, and made pretty certain, that upwards of a hundred thousand souls perished in the city only, whereas before that calamity, it was not supposed to contain so many inhabitants. What magnificent dwellings, what noble palaces were thus depopulated to the last person, what families extinct, what rich and vast possessions left, and no known heir to inherit, what numbers of both sexes in the prime and vigor

of youth . . . after dining heartily with their friends here have supped with their departed friends in the other world!

It was not until 1665 that the plague reached its height in London. There it was the poor man's plague, for the wealthy of the city deserted. They followed the best preventive then known, which was administered, as it was said, in "three adverbial pills—quick, far, and late." That is, go quick, go far, and return late. The nobility



THE MARCH OF DEATH

A fifteenth-century work, probably an allegorical representation of the spread of epidemic disease. One victim has been struck by the arrow of death, another is fleeing on horseback, and a youth is seeking to escape by climbing a tree.

and officials followed this advice thoroughly. The city courts were closed down, and the prisoners died in the jails. The sole representative of the government of King Charles who remained in London was the Duke of Albemarle. It was during this epidemic that the apothecaries of the city won an everlasting respect from the people; they refused to leave their shops and continued to dispense remedies even though many physicians deserted the city. When the plague had subsided, the refugees returned to London. There they found

that the graveyards had risen several feet in height and in the fields there were long unmarked mounds to tell of the destruction of the population. Furthermore their return was coincident with a renewed outbreak of the plague, which took a belated toll of the refugees. The greatest demoralizing effect of the plague came from the lack

Zwey Bücher Theophrasti

Paracelsi des erfarnesten Arzets/ von
der Pestilenz vnd ihren
zufällen.

Durch den Edlen vnd Hochgelehrten Ad-
men von Bodenstein/ in Druck
verfertiget.



TITLE PAGE OF A BOOK BY PARACELSUS

Published in the fifteenth century. The charcoal-brazier is to heat the iron intended to cauterize the plague sores.

of knowledge of the cause of its spread. Men fled, but they knew not what to avoid. In the epidemic in the time of Justinian the disease was attributed to divine causes—it was said to come from the wrath of God. Men prayed and died. In the time of the Black Death they prayed also, but they began to seek out more worldly methods of aiding their prayers. They accused others of spreading the dis-

ease by poisoning the wells; one word of suspicion turned the mob on the accused, and many thousands of innocent men and women were tortured and brutally done to death by the panic-stricken people. Vinegar and scented plague-waters similar to eau de Cologne came much into vogue as prophylactics; they were scat-



FLEAS IN THE HOUSEHOLD

From an old print showing in exaggerated degree the prevalence of fleas in the home. Such vermin were probably of frequent occurrence even in the better households; Pepys in his *Diary* comments a number of times on the fleas in his bed.

tered about the rooms and over clothing in a crude attempt at disinfection. In London coal fires were burned in the streets to purify the air, for there the disease was attributed to atmospheric conditions. In London, also, the dogs were systematically killed, for they were believed to carry the plague.

One important constructive measure grew out of the attempts to ward off the epidemics. In the fourteenth century the Venetian Republic established the first quarantine—an enforced isolation of

travelers for forty days, as the name implies. The choice of this number of days had a Biblical significance; Moses and Christ had both remained isolated in the desert for that length of time. The term has been retained, but the number of days has varied in modern practice with the nature of the disease.

While the Venetians were holding off the infected ships, the English building coal fires and killing the dogs, and the French and Italians fumigating with perfumery in an effort to avoid the plague, no one paid any attention to the rats which were the real transmitters of the disease. It was only in the latter part of the nineteenth century that the blame was put definitely upon these animals.

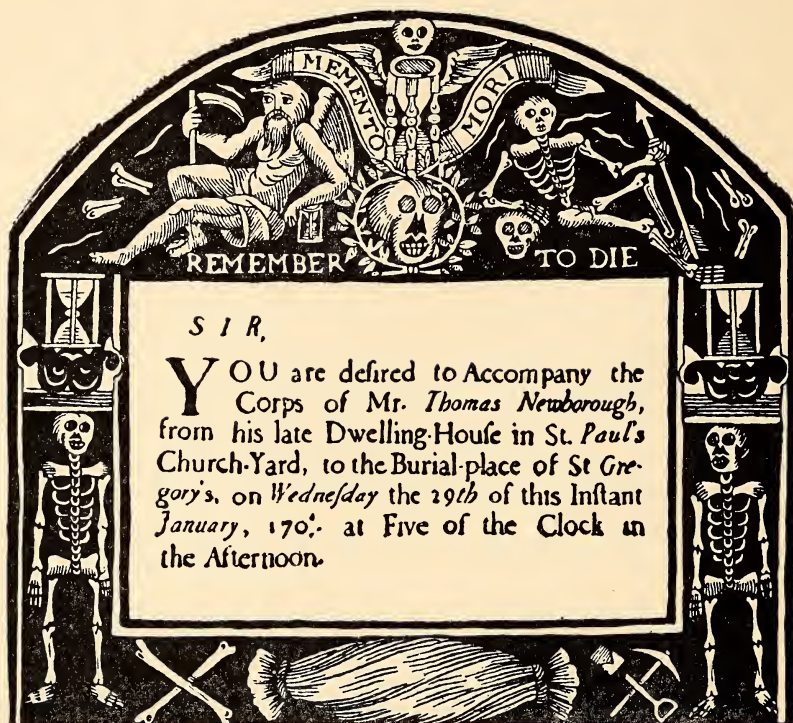
Plague is a bacterial disease of rats. It is transmitted to man by fleas. The fleas leave the dying rats and infest man; by their bite they inoculate him with disease bacteria carried from the rats. Thus it is only in modern times, through knowledge of the means of transmission of this disease, that medicine has been able to devise the measures that now protect Western countries from the plague. Without this knowledge we would be as defenseless against the disease today as were the people of London in 1665.

The most obvious method of eradicating the plague would be to exterminate the rats. But that seems an impossibility except in limited areas. The rat population of the United States certainly exceeds the human many times over. Rats will continue to exist wherever men store food within their reach. Consequently, the essential feature in preventing bubonic plague in this country consists in keeping our own rats free from the disease by preventing the importation of infected rats. To do this the men of our city, state, and federal health services maintain a continual vigilance at seaports, enforcing quarantine and fumigation of ships coming from countries where the bubonic plague may exist. And the plague does still exist. There were sixty thousand deaths from this disease in Manchuria in 1910 and 1911, and twenty thousand in 1918.

Three times in twenty centuries the plague spread unchecked from its Eastern focus, leaving a stricken and demoralized world when it returned to lie dormant for a time except for minor outbreaks. Again in 1894 it spread to every part of the world, but this time it was met and repulsed, as its future rises will be, by the defense that

modern medicine has built against it. This defense rests entirely upon the knowledge gained from medical science.

Modern urban civilization is made possible by preventive medi-



AN EIGHTEENTH-CENTURY INVITATION TO A FUNERAL

Intended to be preserved in memory of the departed gentleman. *Memento mori* were common in bygone days and sometimes took the form of jewelry or medals. Our tastes in funeral matters have certainly become less gruesome; in fact they have reacted to such an extreme that many people avoid using the word death, substituting some synonym. It is doubtful if this extreme nicety, motivated, no doubt, by an attempt to escape facing realities, can be reconciled with the barbarous lavishness of modern funeral services. The vulgar display incident to such events is quite as gruesome as the *memento mori* of the past, and in many cases the expense is a serious and wholly unnecessary hardship upon the family of the deceased.

cine. If its protective measures were relaxed, the pestilences that once raged unchecked would quickly return and even the most civilized countries would be ravaged now as they were in the Middle

Ages. The rate at which pestilences would spread, their extent, and the demoralization which would follow from them would be greater today than at any previous time in history. Railroads and other means of rapid communication would expedite the spread of disease. The crowding of people into cities would allow the spread to be extensive. Urban communities are absolutely dependent upon sustained commerce and transportation even for food and water; the means of commerce and transportation would fail under pestilence.

Imagine, if you can, the conditions of New York or Chicago or any other large city if the plague ran through it unchecked today. A third or more of the population would be dead in a few weeks. The railroads would be stopped, the factories shut down, the stores closed, and on every road leading from the city would be the refugees, on foot, carrying their children, staggering and falling, hungry and thirsty. The city would be in darkness and without food and water, its population panic-stricken and its buildings succumbing to the inevitable spread of fires.

These conditions, real to bygone days, cannot occur now, for we are protected by an army of defenders enlisted in our public health services. Their activities are not heralded by spectacular accounts in the newspapers; glory rarely comes to them. But they keep us free from plague. This disease has reached our shores even in the present century and they have repulsed it. Their weapon is the knowledge of preventive medicine. So long as this knowledge is applied and supported in confidence of its benefits, our age will continue to be the healthiest period that the world has ever known.

CHAPTER SEVENTEEN

THE DANCING MANIA



ONE day in browsing through an old medical book by the famous physician, musician, and priest, Athanasius Kircher, I came across a page of music—music for the dance of the tarantati. It is one of the very oldest surviving tarantellas written for this dance. It was played to treat a disease, a nervous disease, an imaginary disease, one which appeared as the strangest excrescence that ever arose upon disordered human society—the dancing mania that swept over most of Europe five hundred years ago.

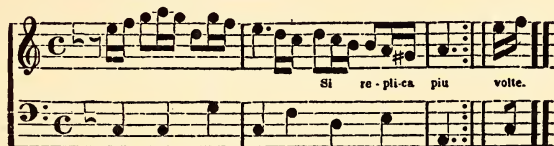
This music was played, so Father Kircher tells us, upon the Turkish drum and the wood-wind instruments.

The tarantella is repeated over and over, the insistent throb of the drum, the compelling cadence of the mellow oboe and the flute, stir our imagination. We are carried back four hundred years; on a clear summer's day we walk across the meadows of Apulia, what is now part of southern Italy. Where the railroads now run through busy towns there were then only old Roman stone roads through olive groves and across fields where shepherds tended their flocks. The cities were few, but we approach one now, founded as a Spartan colony twenty-six hundred years ago—the town of Tarentum. As we approach nearer we hear very faintly the tarantella.

Where that music is played there is a girl—a young girl. She has lain cold, rigid, and pale until in haste the musicians have been called. For a time they have played, but there has been no change in the girl's condition. Then her head rolls wearily, a hand follows the tempo. Her body stirs. She rises. Wearily, dizzily she sways to the music. She becomes steadier; a foot taps the ground; her movements grow faster—faster. Now she leaps into the air again and

again. She dances wildly, with abandon; her eyes are fixed and staring. Higher and higher she leaps, until, lashed by her emotions into

I. *Primus modus Tarantella.*



II. *Secundus modus.*



III. *Tertius modus.*



IV. *Antidotum Tarantulae.*



MUSIC FOR THE DANCE OF THE TARANTATI

As given in *Magnes sive de Arte Magnetica*, 1654, by Athanasius Kircher. The tarantella is a survival of the dancing mania in Italy, Tarentum, in Apulia. The spider, the tarantula, likewise obtains its name from the same town. Probably from the association of names there arose the belief that the dance cured the bite of the spider. The bite of Apulian tarantula does not cause serious poisoning. The music given here is for one of the oldest surviving tarantellas.

Athanasius Kircher was a German scholar of the seventeenth century; educated in the Jesuit order, he taught philosophy, mathematics, and Oriental languages at Würzburg until driven from there by the trouble of the Thirty Years' War. He settled in Rome and taught at the Collegio Romano. He was the first scholar to call attention to the Egyptian hieroglyphics.

a fury of movement, she twitches, twists, and jumps; her dance has become a veritable whirlwind of motion.

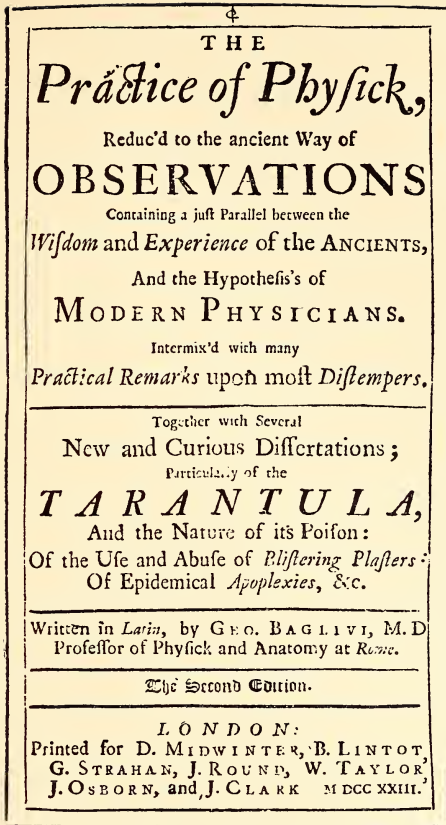
But look at the spectators—there are women and there a man, swaying to the music, their hands twitching. And now with eyes fixed and faces rigid one after another they join the girl in the center of the crowd. Ten, twenty, thirty are leaping wildly in that widening circle of spectators. More are joining. It is the dance of the ancient tarantati.

If you wish to stay for hours—many hours, far into the night—standing there in the light of flickering torches, the dance will finally cease and the tired musicians stop. They have not dared to stop until the young girl, the women, and the men have fallen to the ground exhausted. And as the dancers fall, one by one they are drawn away, footgear ragged, clothing torn, bodies swollen—unconscious. A band of cloth is put about their bodies, tied and then twisted tightly with a stick; perhaps some one presses a foot upon their abdomens. They stir again; they stagger to their feet, numb, tired, but happy—troubles, worries, fears, and sorrows forgotten in the sense-benumbing exhaustion of physical exertion.

These men and women knew not why they danced; but we know that they did so because theirs were the frayed and ragged nerves of people who had suffered in mind to the limit of human endurance. Their dance was as the scream, the sudden movement that gives relief from long-pent-up emotion. Such was the tarantati four hundred, five hundred years ago.

They knew not the reason, but they sought it and in so doing founded a superstition that carried on the tarantati long after its original cause had passed. To explain their wild action they said that they had been bitten by tarantulas and that the music healed them. Their statements were believed by those who came after them; the belief grew and spread. So persistent are superstitions that for three hundred years the tarantella players were called to cure people who were bitten by spiders.

As time went on, new ideas were added; the dance was supposed to bring on a perspiration which washed away the poison of the tarantula. But not quite all of it; a trace remained, so that every summer the dance had to be repeated by all who had ever been bitten or thought they had or wished they had. Then by shifting customs the tarantati became a festival, "The Women's Little Carnival



A DISCOURSE ON THE POISONOUS TARANTULA

Title page from an English translation of the works of Georgio Baglivi. Baglivi, in the eighteenth century, held the chair of medical theory in the *Collegio della Sparenza*, Italy. He taught the iatrphysical doctrine, the laws of mechanics as applied to bodily functions. He likened the teeth to scissors, the chest to bellows, and the heart and blood vessels to a waterworks, a system still used in teaching physiology to children. The followers of the iatromathematical system ignored chemistry and attempted to explain all medical practice upon mechanical principles; their efforts were manifest in the first attempts to put pulse-counting and thermometry on a practical basis.

Baglivi, in the work shown here, discussed among other things the poisonous effects of the tarantula bite. He says that there are accounts of many people who, when bitten by the tarantula, perished miserably because the tarantella, which would have afforded them relief, was not played to them. He discusses at length the relation of music to the cure of the tarantula bite.

Day." The spider was forgotten. Now even the dance is gone except for exhibition by strolling players.

The story of the tarantula bite as the cause of the dancing mania that arose in Apulia and spread through the Italian peninsula was just an afterthought, something to explain what the people could not understand. The original tarantati was part of the dancing mania that swept over Europe in the fifteenth century. It was a social hysteria, a physical reaction to the emotional stress of the time.

You are familiar with the way abnormal excitement may be engendered in a mob of people. One man, two, or even three by themselves rarely show the wild and unreasonable excitement that a group may display. Emotional excitement is contagious. One excited man may inflame a whole crowd and start a panic.

Emotion seeks an outlet in physical action. We laugh, we talk, we cry, we scream, we clap our hands, stamp our feet, run, or fight to relieve emotional strain. When the individual is merged in the crowd, his restraining consciousness of self, his timidity, his fear of ridicule, slip from him as he surrenders his identity to that of the mob. And so in a crowd emotional reaction is more easily inflamed and mounts to a higher pitch.

The dancing mania was a mob excitement engendered in a people made ready for an emotional reaction by the fears and worries of the time.

We regard as a normal thing these emotional outbursts in primitive and savage people. With them life is uncertain and hard; they are usually a dour people, stoics, not given to displaying their emotions in laughter or in crying; they repress their emotions; they suffer in silence. Then some night the tribe gathers to dance, led by their medicine-man. He contorts his limbs, he writhes as he leaps about the camp fire. His grotesque shadow flickers across the circle of his tribe. In the exaltation of his emotion the contagion of his ecstasy reaches those who watch him. They move, they mutter, and one, then another, and another break from the circle and dance in a frenzy that brings relief to long-pent-up emotions.

These are savages—we are civilized and different. But are we—are we different? No! Our surroundings have changed, but we haven't. The savage when civilized does not enter his dancing orgies



VICTIMS OF THE DANCING MANIA
 From a drawing by Pierre Bruegel, the elder, 1560

with the abandon of his primitive days. Life has become easier: the emotional strain is less pressing.

But even civilized people can break when life becomes too difficult. If we are harried on every side by worry, grief, disappointment, and continual and ever-impressing uncertainty of life, we seek forgetfulness in the physical exertion that brings a sense-benumbing exhaustion. We, too, can have a dancing mania, as did our ancestors five hundred years ago. Do you remember the period of hectic gaiety that followed the emotional strain of the World War? Multiply that a thousand times and you will have the dancing mania as Europe once knew it.

Put yourself back five hundred years into those gloomy days of European civilization closing the Dark Ages. Think of yourself as living in a crowded walled city where there was no sanitation of any kind, where a foul stench filled the air, where food was scarce and bad, where men and women died of starvation, and where life for most was little better than that of beasts. But overshadowing all other hazards of life was that which came from uncontrolled epidemic diseases.

From the twelfth to the fifteenth century Europe was visited by frightful plagues that gave the exhausted people scarcely any time for recovery. Smallpox ravaged them; measles was more destructive than it is today; leprosy spread widely, and those afflicted were torn from their families and banished by Biblical precedent from human society, to pine away in lonely huts. The disease of Saint Anthony's fire, now almost forgotten, was the dread of town and country—a withering, deforming disease that struck whence no man then knew, but that left behind it cruelly crippled bodies. In those days the mothers often scarcely knew their children before they were carried from their arms to the grave. These things were the accepted lot of men, borne in resignation.

To these tragedies of life, borne then as natural and inevitable, there came a catastrophe which left men's minds morbidly sensitive, irritated, and raw, a calamity that tortured the people to a frenzy of anxiety and sorrow. It was that unparalleled epidemic, the Black Death, the Oriental bubonic plague. In a great wave it broke over the defenseless people of Europe. Families were exterminated; fields

lay neglected, for in them where they had fallen beside their plows were the unburied bodies of the peasants. Famine added to the horrors of the stricken people.



A SCENE FROM THE PROCESSION OF THE DANCING MANIA

Engraved by Hondius (1624). From a painting by Peter Brengel, the elder, sixteenth century. Bagpipe-players form part of the procession; their music helps to control the sturdy women who are struggling, or dancing, as it was called, in the grasp of the male attendants. The violent twisting of the neck is shown in the group to the left. In the background a woman partially recovered, but still under restraint, is being led across a bridge to where, on the bank of the stream, is seated one of the women almost wholly restored to sanity, but still dazed and bewildered.

When finally the plague was replete with its ghastly harvest, there was an interim of freedom from this disease, a period in which society was reorganized, in which the fields were brought again under cultivation, and in which the population grew apace. Then

the next wave of the plague broke and destroyed all that had been built up. It was a hopeless struggle.

Between 1119 and 1340—a period of 221 years—the plague ravaged Italy sixteen times. No words will ever describe its horrors, but the people who saw them, who lived in those days so full of uncertainty of life, of sorrow, and of anxiety, were wrought in mind to a point of hysteria.

It was then that the dancing mania began and was propagated by the mere sight of the sufferers. It was not a new affliction. There had been isolated outbreaks of this mob excitement previously, but never before had so many people been drawn into the mania. Never before had the provocation been so great.

In 1374 a group of men and women who had come out of Germany wandered into the streets of Aix-la-Chapelle. The members of the band formed a circle and then began to dance. They danced wildly, screaming with fury, foaming at the mouth, all control over senses lost. Finally, after many hours they fell to the ground in exhaustion. There they rolled in agony until the bystanders struck and tramped upon their swollen abdomens.

In a short time this detestable disease had spread by sympathy to many spectators, who joined in the wild dances. It extended to neighboring villages and from them to others in an ever-widening circle.

In 1418 this mental turmoil reached its highest point in the city of Strassburg. Those afflicted could be seen day and night accompanied through the streets by musicians, for the belief had grown up that music was a remedy. Following these unfortunates whose harried minds had found an outlet in this mania were crowds of spectators. Some were attracted by curiosity, but with them were anxious parents and relatives who came to look after those among the sufferers who belonged to their respective families and, most pitiful of all, there in the crowd were young children crying bitterly as they twisted among the hurrying feet of the spectators in an effort to escape being tramped upon. They had been deserted by parents who had joined in the dancing mania.

The priests of the towns attended with solicitude the sufferers of this malady of the imagination, extending to them the comfort

and sympathy of religion. Indeed, music and religion were the only forces which seemed to have effect upon the hysterical people who were struck with the mania. Saint Vitus became the patron of these sufferers, who in their calmer moments appealed for his aid to keep them from the paroxysms of their mania.



AN OUTBREAK OF CONVULSIVE SEIZURES IN CHURCH

From a scene occurring in 1861. Extreme religious exaltation is often associated with bodily movement, a muscular expression of emotion. Numerous sects, especially during days of persecution and consequently of augmented fervor, have been noted for these physical manifestations and sometimes even named for them, as the Quakers, Shakers, Jumpers, Rollers, and *Convulsionnaires*. Among some sects of the Methodists outbursts of wild motion have occurred, especially during revival meetings. The example of one person so affected in a gathering quickly incites others to the same behavior by a sort of sympathetic contagion. The history of the *Convulsionnaires* of France in the eighteenth century, a group of fanatical followers of Cornelius Jansen, founder of Jansenism, affords an extreme example of wild movement in religious enthusiasm.

The term Saint Vitus' dance has survived from the days of the dancing mania. Although we no longer have the mania, the term is applied to a certain nervous disease in which there is twitching of the face and arms; otherwise it has no relation to the mental malady, the social insanity, which spread over Europe five hundred years ago and which persisted with diminishing intensity for two centuries.

Can you contrast in your mind the conditions of life of the people in those days of the dancing mania with those of your own life? You have sorrows, worries, fears, but you have been relieved of one great worry, one great anxiety, the greatest of all—the nerve-racking dread that comes from ever-impending plague and pestilence and the sense of constant uncertainty of life. Are not your most continual worries and anxieties mainly economic and social rather than medical? Modern medical science has brought disease under control to a far greater extent than at any other period in human history. It is giving us today the healthiest and consequently the sanest period the world has ever known. In health worries are borne with more confidence than in sickness. Modern medical science is civilization's greatest force for human betterment. The civilization towards which it leads is one of normal-bodied and hence normal-minded human beings.

CHAPTER EIGHTEEN

THE TERRIBLE MINISTER OF DEATH




IN ONE of Dumas' historical novels of the French Revolution there is an epilogue called "The Ninth of May." The year is 1774. The scene is set before the palace at Versailles about eight o'clock in the evening; the sky is black with an approaching storm. An old man is seated on a bench, and near him, pacing restlessly back and forth, is a young man. These two represent allegorically the progress of France towards a republic. The old man is Jean Jacques Rousseau, the philosopher of man's equality; his younger companion is Jean Paul Marat, soon to become the firebrand of the Revolution. These two watch intently the flickering of a candle exposed in a window of the palace. The light is a signal; Louis XV is dying; as long as life remains to him the candle will be kept burning there.

Suddenly the window becomes dark; the king is dead. The two men in the courtyard have witnessed the passing of an old and the dawning of a new reign. But unwittingly they are spectators of an event vastly more portentous than a mere change of rulers. The death of Louis XV was an historical event of deepest medical significance. He died of smallpox, the last ruler of any civilized monarchy or democracy to die of this disease. His death came twenty-four years before the time when mankind was emancipated from a scourge that struck the palace as freely as the hovel. In the time of Louis XV smallpox was a universal disease; every one expected to have it sometime in his life; one in every twelve, prince or pauper, died of it. Those who escaped with their lives bore its marks in pitted and distorted faces and blinded eyes.

Thomas Jefferson was our first President to be vaccinated, and

the principle had been discovered then only three years before. To-day if a ruler or a prominent statesman were to die of smallpox or even have the disease, it would be a scandalous occurrence. We attribute to such men intelligence and sound judgment, and since smallpox is preventable, if a man acquires the disease, it is evi-



BULLETIN DE LA MALADIE DU ROI.

De Versailles le 10 Mai, à 7 heures du matin.

LA fièvre s'est soutenue très-forte toute la nuit. La respiration qui commençoit à être gênée hier au soir, est devenue très-précipitée vers neuf heures, & a continué dans cet état, avec quelques variations, jusqu'à ce matin. Il n'y a eu aucun délire. SA MAJESTÉ a conservé toute sa connoissance. Les vésicatoires ont peu rendu. Les urines ont bien coulé.

Signé LE MONNIER, LASSONE, LORRY, BORDEU, DE LASSAIGNE, LA MARTINIÈRE, ANDOUILLE, BOISCAILLAUD, LAMARQUE, COLON.

Mardi le 10. Mai 1774. à 3 heures 14 minutes du jour

A BULLETIN ISSUED BY THE PHYSICIAN OF LOUIS XV

The king died of smallpox in 1774. He is said to have suffered from the same disease in 1728. Cases of two attacks of smallpox are of rare occurrence. There are a number of stories to account for the king's fatal infection; most of them state that he, with DuBarry, met and possibly entertained a peasant child whom, according to some accounts, they are said to have bathed and dressed for their amusement. The child had smallpox. The tales vary as to the origin of the child and the location of the occurrence. According to Voltaire, Louis, while on a hunting excursion, encountered the funeral procession of a young girl dead of smallpox; the king attributed his illness to this occurrence.

dence of neglect, indifference, or ignorance, qualities that we do not associate with those who are eminent.

Yet before Edward Jenner's announcement of the discovery of vaccination in 1798, the presence of smallpox was not a sign of ignorance or neglect. The disease was inevitable; men were defenseless against it. Louis XV was one of a long line of kings, queens, and princes who died of the disease. To mention only a

very few of them, there was William II of Orange; Emperor Joseph I of Germany; two children of Charles I of England; a son of James II and also his daughter, Queen Mary, and her uncle, the Duke of Gloucester; Peter II, Emperor of Russia; Henry, Prince of Prussia; two Empresses of Germany; and a Queen of Sweden. For every one of these who died of smallpox there were ten or a dozen famous characters who had the disease, but survived, pitted and deformed, like Charles IX of France, whose enemies jibed at him because the ravages of smallpox had distorted his face until he seemed to have two noses instead of one. The elegant court scenes

*! Vous voulez que je vous fasse connaître mes
peines. Et c'est mon cher Concitoyen vous les
connaître, elles viennent de mes maux qui
me mettent hors d'état de supporter le voyage
et de me rendre dans la patrie. Je souffre de
ma pauvre veſſie, à cela près je ſerois heureux,
et j'accepterois pour être vos officiers, si je
croyois qu'une ſonde d'or me feroit moins
ſiſſer qu'une autre.*

J. Rousseau

AUTOGRAPH OF JEAN JACQUES ROUSSEAU

that we see in paintings do not show the realities; in life the kings and courtiers were pock-marked.

I wish I could picture to you the actual conditions of life before smallpox was brought under control by vaccination. But there is no adequate description left by the men who knew its ravages; there are merely fragments that suggest its horrors. Conditions only become strikingly evident by contrast. The people of a hundred and fifty years ago, scourged continually by smallpox, did not write vivid descriptions of their misfortunes, for they assumed that every one was familiar with their lot. It is only when conditions improved that we were able to see the past in true perspective.

We have a similar but very much milder situation today in the

almost universal occurrence of head colds. In spite of the fact that they are the greatest single cause of lost time from occupation and certainly one of the greatest contributing factors to serious and fatal respiratory diseases, no one needs to describe them, for we all know them. There will come a time, perhaps, when some emancipated generation will regard the coughing, sniffing, nose-blowing people of our time with the same feeling of pity that we experience when we look back at the pock-marked population of little more than a century ago. Who will find then an adequate description of how we suffer with head colds? We accept them as inevitable; formerly people considered the deadly smallpox equally inevitable.

But after the disease had come under control, the historian Macaulay, looking back from his time, could describe the condition as he saw it. Here is the vivid passage that he penned:

That disease, over which science has since achieved a succession of glorious and beneficial victories, was the most terrible of all the ministers of death. The havoc of the plague had been far more rapid; but plague has reached our shores only once or twice within living memory; and smallpox was always present, filling the churchyard with corpses, tormenting with constant fear all whom it had not yet stricken, leaving on those whose lives it spared the hideous traces of its powers, turning the babe into a changeling at which the mother shuddered, making the eyes and cheeks of the betrothed maiden objects of horror to the lover.

Perhaps the most pathetic lines written about the disease are in the epigram that Ben Jonson dedicated to it three hundred years ago—a hopeless protest against the inevitable.

Envious and foul disease, could there not be
One beauty in an age, and free from thee?

If you like your picture of the situation in a less poetic and more practical form, consider for a moment one of the ten or twelve outbreaks of smallpox in eighteenth-century Boston. In the epidemic of 1792 the town contained 18,000 inhabitants. Of these somewhat more than 10,000 had already had the disease and were consequently immune. During the epidemic the remaining 8,000 acquired it. Statistics can never be simpler than that. But if you prefer them in larger numbers—in the eighteenth century 60,000,000 people

died of smallpox in Europe alone, 600,000 deaths a year from this one disease.

Several REASONS

Proving that Inoculating or Transplant-
ing the *Small Pox*, is a Lawful Practice,
and that it has been Bleffed by GOD
for the Saving of many a Life.

By *Increase Mather*, D.D.

Exod. XX. 13. *Thou shalt not kill.*
Gal. I. 10. *Do I seek to please Men? if I please Men,*
I should not be a Servant of CHRIST.

It has been Questioned, Whether *Inoculating*
the *Small Pox* be a Lawful Practice. I incline
to the Affirmative, for these Reasons.

I. **B**ECAUSE I have read, that in *Smyrna, Constantinople*, and other Places, Thousands of Lives have been saved by Inoculation, and not one of Thousands has miscarried by it. This is related by Wise & Learned Men who would not have imposed on the World a false Narrative. Which also has been published by the *Royal Society*; therefore a great Regard is due to it.

II. WE hear that several *Physicians* have Recommended the Practice hereof to His Majesty, as a Means to preserve the Lives of his Subjects, and that His Wise and Excellent Majesty King GEORGE, as also his Royal Highness the Prince have approved hereof, and that it is

A PAGE FROM INCREASE MATHER'S PAMPHLET ON INOCULATION AGAINST SMALLPOX

Published in 1721; the illustration used here is from a reprint of this rare and highly prized medical curiosity. It was the son, Cotton Mather, who introduced inoculation into America; the father, Increase, one-time president of Harvard, merely expresses in print his favorable views on the practice. Cotton Mather, minister of the Second Church of Boston, who had read a description of inoculation against smallpox in the publications of the Royal Society of England, induced Dr. Boylston to employ the practice. Tremendous opposition was aroused; attempts were made to destroy the houses of both Mather and Boylston.

Before the days of vaccination, with a certainty of contracting smallpox before them, men sought a way of getting it in a mild form. Outbreaks of the disease varied greatly in virulence, and in-

fection in a mild form led to protection from a grave one. In the Orient a method of direct inoculation had been in vogue for centuries. Please do not confuse the drastic procedure of inoculation with the safe and harmless vaccination that replaced it. Inoculation means this; the purulent infectious material taken directly from the sore of a person suffering from a mild attack of small-

gory, especially the 32d, 57th and 18th, of the line, commanded by General Massena, and who in three days beat the enemy at St. Michel, at Rivoli and at Roverbella. The Roman legions marched 24 miles a-day. Ours marched 30, and fought also occasionally.

Citizens Dessain, Chief of the 14th demi-brigade of light Infantry; Marquis, chief of the 29th; Fournely, chief of the 17th; have been wounded. Generals of Brigade, Vial, Brune, Bon, and Adjutant General Argod, particularly distinguished themselves.

The individual instances of bravery, are too numerous to be enumerated here.

Signed, BUONAPARTE.

Capitulation made by the imperial troops under the walls of St. Georges, 27 Nivose, 5th year of the Republic.

Art. I. The honors of war granted, and all the troops prisoners of war.

II. The Officers shall retain their swords, their effects, and their equipage, and the soldiers their knap-sacks.

III. The General Officer, and other inferior officers may repair to their homes, if the General in chief consents to give them permission.—I engage my word and honour to inform the General in Chief that I engaged for this Article.

IV. Information shall be communicated to Marshal Count de Wurmsfer of the present Capitulation.

V. The sick and wounded shall be taken care of with all those sentiments of humanity

February 10.

We received this morning a letter from Dover, of which the following is an extract:

"I am sorry to acquaint you, that we are informed here that an embargo is laid on the other side from Brest to Dunkirk, which information was gained through a fishing-boat. I presume it must extend along the coast—how to credit this report I cannot as certain; but true it is, a *secret* expedition is going on at Dunkirk."

Admiral Duncan is expected in the North seas with a strong squadron. The greatest precautions are adopted in Yarmouth Roads to prevent a surprise. Ships are stationed at the entrances of the Roads, and watch boats are employed all night in rowing from one side of the channel to the other.

Letters have been received from Ireland which represent the internal state of the kingdom to be alarming.

INOCULATION.

THE subscriber respectfully informs the public that he has lately opened an inoculation, at the pleasantly situated hospital in Glarendbury; Gentlemen and Ladies who wish to have the Small-Pox by this safe and easy method, may be boarded, and have faithful attendance paid them, by their obedient,

ASAPH COLEMAN.

March 23, 1797.

EIGHT months is allowed by the Court of Probate for the district of Hartford, for the creditors of the estate of Col. SAMUEL TALCOTT, late of Hartford deceased;

FOR GENTLEMEN AND LADIES WHO WISH TO HAVE SMALLPOX

Extract from the *Connecticut Courant* of 1797. Mr. Asaph Coleman is here advertising inoculation for "Gentlemen and Ladies who wish to have the Small-Pox by this safe and easy method."

pox is rubbed into the arm. Real smallpox is acquired, but since the attack is mild, the probability of survival is better than if the disease were acquired by chance from a virulent case. Inoculation was introduced from the Orient into England and the Continent by Lady Mary Wortley Montagu, the wife of the English ambassador to Turkey, and into America by Increase and Cotton Mather.

Inoculation is a truly heroic method of prevention, and many

people quite naturally had a dread of it. Nevertheless, the practice spread extensively in the eighteenth century, particularly among people who were prominent and well educated. Louis XVI of France was inoculated the same year that his father, Louis XV, died of smallpox. Catherine the Great set the example in Russia; both she and her son were inoculated, and then they deliberately exposed themselves to smallpox to prove to the people that the measure gave protection. During our Revolutionary War, George Washington was an ardent advocate of inoculation. He ordered that all recruits to the Continental army who had not already had smallpox should be inoculated. Martha Washington also protected herself in this way.

Inoculation prepared the way for vaccination, an entirely different procedure. It is in this connection that Edward Jenner came upon the scene. He was a country practitioner at Gloucestershire, England. Among the dairy farmers there was a popular belief that smallpox could be prevented by acquiring a much milder disease, one that was only local and never fatal, known as cowpox. Occasionally a milkmaid who had scratched her hand and then milked a cow that had cowpox developed a small pustule where the scratch had been. Girls so affected were considered to be immune to smallpox.

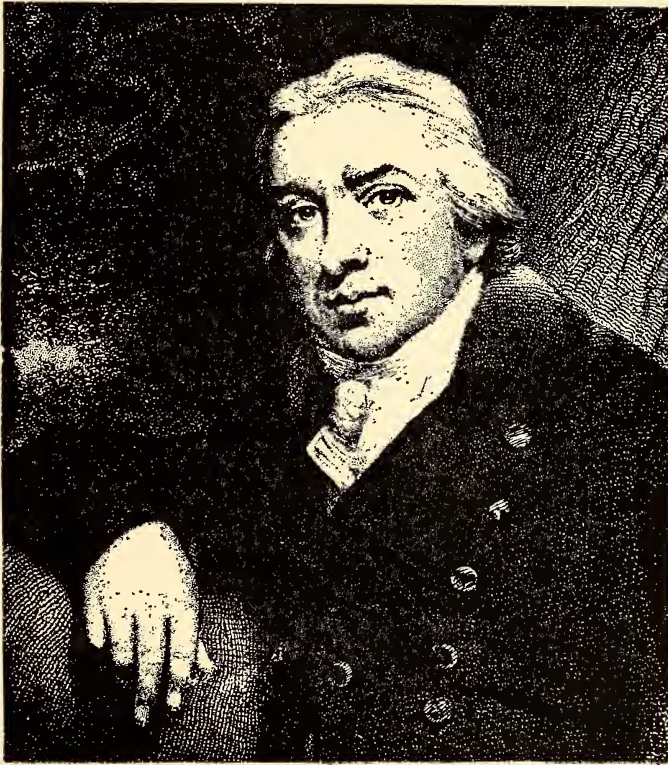
In 1797 Dr. Jenner decided to investigate this belief experimentally. A dairymaid named Sarah Nelmes had acquired cowpox. Jenner took matter from her sore and put it on a scratch in the arm of a boy named James Phipps. A typical vaccination resulted. But that was only the first step in Jenner's experiment. The boy must be exposed to an actual case of smallpox to see if the vaccination had given him protection.

Three months later matter from a smallpox pustule was put on the boy's arm. No disease developed. Jenner repeated his experiment on other subjects, with the same successful results. In 1798 he published his observations.

In discussions of the efficacy of vaccination by those who have some doubts of its positiveness in preventing smallpox one point is frequently overlooked. It is this: All of the early vaccinations—there were many thousands of them—were proved effective by sub-

sequent exposure to actual cases of smallpox, as was done in the case of the boy, James Phipps. None developed smallpox.

Dr. Benjamin Waterhouse of Boston was the first physician to use vaccination in America. In 1802 he vaccinated seven of his children; later he took them to the pesthouse and exposed them to smallpox, but none acquired it. He even carried the proof of protection farther



A PORTRAIT OF EDWARD JENNER

than Jenner. He vaccinated nineteen boys. Twelve of these he afterwards inoculated with smallpox matter and at the same time and with the same matter he inoculated two boys who had not been vaccinated. The twelve remained free from the disease; the two unvaccinated boys fell ill with the smallpox.

In the early days of the practice of vaccination the procedure was vastly different from that of today. Some of the difficulties en-

countered then were the basis of prejudices that exist now in the minds of uninformed people, who even sometimes confuse vaccination with inoculation. In Jenner's day no one knew anything about bacteria or infection. Much of the procedure then was arm-to-arm vaccination. That is, a man was vaccinated with cowpox and the matter taken from his arm and put on that of another man, and from him to a third, and so on. No antiseptic precautions were used. Knowing as you do the dangers of transmitting infection from person to person, you can well imagine the results of some cases of these early efforts at vaccination. Along with the cowpox went the germs of any disease present. It wasn't until the end of the nineteenth century that antiseptics were used even in surgery.

An incident occurring in Spain illustrates the crude methods of vaccination in its early days and also the pathetic eagerness with which vaccination was welcomed by a people who knew at first-hand the horrors of smallpox. Soon after Jenner's announcement of his discovery a ship set sail from Spain. Its cargo was children. They were the living bearers of vaccine virus to the Spanish colonies. Spain in her conquests had brought smallpox to the New World. She carried it to the American continent in the sixteenth century, and within a short time three and a half million people died of the new disease. It spread to the American Indians, and we are told that half of them succumbed to it. On the ship that carried the priceless vaccine virus to the far-distant colonies two children were vaccinated each week to keep the virus active. They made a living bridge of vaccine between Spain and her colonies.

A hundred years ago people could appreciate the blessings of vaccination, and tribute was paid to Jenner in every quarter of the globe. The American Indians sent a deputation to thank him personally; in far-off Japan the natives of a fishing village erected a statue of him. The Dowager Empress of Russia sent him a ring and gave the name Vaccinoff to the first child to be vaccinated in Russia. But Napoleon in 1805 paid him the supreme compliment: he ordered universal vaccination of the men in his armies.

The vaccination that we have today is very different from the crude method which was used in Jenner's time. Our virus is obtained from calves and is so prepared that it is a vastly purer prod-



THE CHARIOT OF VACCINA

An anti-vaccination caricature published in 1800. Like most publications of this kind it is intended to appeal to the emotions rather than to the reason, to frighten people. The first anti-vaccinationists were a group of men who practiced inoculation and whose vested interest was threatened by the new measure; these men were largely responsible for violent caricatures on vaccination. They launched the belief, still promulgated by ignorant fanatics, that vaccination causes such wholly imaginary diseases as "cow syphilis." Some people today, while admitting the benefits of vaccination, are opposed to the measure as a compulsory one for all children; their interest is philosophical rather than medical; they should not be confused with the people who believe that vaccination is an unnecessary and ineffective measure. The more fanatical of the latter subscribe to such "bogey man" literature as the above illustration; the better educated of the anti-vaccinationists admit that smallpox has diminished enormously, but deny that vaccination is responsible. They maintain that the decrease is due to improved conditions of general hygiene and segregation, although it has been demonstrated repeatedly that the application of neither of these measures will control the spread of smallpox. Nearly all of the early vaccinations were proved effective by actually exposing the person, after vaccination, to smallpox. Furthermore, the majority of cases of the disease occurring in this country are among adults who have not been vaccinated; it does not spread to their recently vaccinated children who live under the same conditions of hygiene and sanitation.

uct than the milk we drink. Since 1902 its preparation has been under the control of our federal government, and every specimen is inspected and certified before it is dispensed.

The prevention of smallpox can be made positive and absolute, but unfortunately we have a disgracefully high prevalence of the disease in this country. There were forty thousand cases in 1929. There is a striking fact in connection with these cases that has a bearing on personal preventive medicine. Before vaccination came into use, smallpox was a disease of childhood; the majority of cases occurred before the age of ten. The children of those days were born into a world where smallpox was almost universal. They acquired the disease in their early years and died by the millions. Nowadays, however, the situation is changed; smallpox has become a disease of adults rather than children. In most places—there are exceptions in our own country—children must be vaccinated before they are admitted to school. For their true protection they should be vaccinated in their first year of life and again at ten or twelve. Vaccination gives positive protection for seven to ten years, and then the immunity gradually diminishes unless the vaccination is repeated. The majority of adults in this country have been vaccinated only once, and that in school years. Consequently, while most children are protected, we have a large adult population whose immunity has run out; they are unprotected against smallpox. It is among these adults that most of our cases of smallpox occur.

CHAPTER NINETEEN

EXPLORATIONS IN NUTRITION



VERY time I go into one of the great laboratories of physiological chemistry, where nutrition and diet are studied, where the conversation is of vitamins and minerals, proteins and roughage, I am reminded of the explorations of Vasco da Gama and Captain Cook, and the cruises of Drake and Hawkins. When I look over the row upon row of wire cages holding white rats, I think of those old wooden sailing-vessels that once made their adventurous ways through foreign seas.

It isn't such a stretch of the imagination from experiments in nutrition to the explorations of da Gama, Cook, and Drake. The forecastles of those old sailing-ships were cages in which, quite unintentionally and quite unavoidably, nutrition was studied upon men, at the cost of wrecked and ruined explorations and many, many lives.

I stand in the physiological laboratory and watch the chemist dole out the rations for a group of rats, carefully weighing the food—so much protein, so much carbohydrate and fat, the right proportion of minerals, and then, the vitamins. But one of these is kept out of the food for a group of rats—everything needed is put in except one vitamin. Will they grow, will they live, will they sicken and die? What change will occur in them from lacking just one item of diet when all the others are present? A month, two months, or three, and the answer will be known.

Can't you in your mind see the captain of an old-time sailing-vessel doing this same experiment—unintentionally—but nevertheless doing it? His ship lies alongside the dock. His men are busy loading her. A steady stream of provisions comes over the side, weighed

and checked. Barrels of flour, rice, and oil are rolled into the hold; salt pork and salt beef follow after. A great store of provisions there, but it is to be a long cruise, and who can tell about winds and tides in unknown quarters where explorers sail? These provisions must be of a kind that keep well—no perishable goods—for it may be a year or more before land is reached.

This ship is a cage of men restricted to a diet in which for months there will be neither fresh food nor canned food; no fruit, no milk, no butter, no eggs, no salads—only dried and salted food.

The voyagers have gone on into uncharted seas; there dangers lie before them in coral reefs and icebergs, submerged rocks and unfriendly natives. Those are the dangers they look for and expect; they are the ones that fill the pages of history and adventure. But the greatest danger lies on the ship itself; it is an insidious one that is slowly encompassing the men. Healthy and vigorous they were when the cruise started, singing at their tasks, but now they are listless and indifferent; they limp wearily along the decks, and groan as they pull at the ropes. Half of the men are already in their hammocks, gums swollen and bleeding, eyelids puffed and closed, and limbs weak and painful. Scurvy has broken out on the ship. Men are dying.

Day in and day out the diminishing remnant of the crew drops its shrouded companions over the side. A lethargy has seized every man on board. Another month, unless they come to land, and all will be dead of this disease of nutrition—scurvy. But they are fortunate. They land at some far-off tropical island. The weakened survivors stagger ashore with the water-casts. Ravenously they eat fresh food: shellfish, fruit, and meat; the ship is stocked with a perishable cargo of vegetables and sails away. A week passes, and already the men are recovering from their strange malady. Pains leave the limbs and joints; the swollen gums shrink to their normal size; accustomed energy returns. Then, on the long homeward voyage the fresh food is exhausted; the diet again becomes flour, and dried and salted meat. Scurvy returns. Only a sickly remnant of the crew is left when the home port is finally reached—tattered, scurvied men.

Sir Richard Hawkins stated, in the latter part of the sixteenth

century, that he could give an account of ten thousand men who had been destroyed by scurvy in the twenty years that he had been at sea.

A N
E S S A Y
O N
D I S E A S E S
I N C I D E N T A L T O
E U R O P E A N S I N H O T C L I M A T E S .
W I T H T H E
M e t h o d o f p r e v e n t i n g t h e i r f a t a l C o n s e q u e n c e s .
B y J A M E S L I N D , M . D . F . R . S . E d .
F e l l o w o f t h e R o y a l S o c i e t y o f M e d i c i n e a t P a r i s ,
a n d o f t h e R o y a l C o l l e g e s o f P h y s i c i a n s a t E d i n b u r g h
a n d C o p e n h a g e n ;
L a t e P h y s i c i a n t o t h e R o y a l H o s p i t a l a t H a l l a r ,
n e a r P o r t s m o u t h .
T o w h i c h i s a d d e d ,
A N A P P E N D I X C O N C E R N I N G I N T E R M I T T E N T F E V E R S .
A N D ,
A s i m p l e a n d e a s y W a y t o r e n d e r S e a W a t e r f r e s h , a n d
t o p r e v e n t a S c a r c i t y o f P r o v i s i o n s i n l o n g
V o y a g e s a t S e a .
T h e F O U R T H E D I T I O N .
A r t s q u æ s a n i t a t i t u e n d æ p r æ s t i d e t , i i s q u i s i b i p a r u e r i n t c o n -
s t a n t e m s a n i t a t e m p r o m i t t i t . G A L E N .
L O N D O N ,
P R I N T E D F O R J . M U R R A Y , N o 3 2 , F L E E T S T R E E T .
M D C C L X X V I I I .

TITLE PAGE TO JAMES LIND'S BOOK ON TROPICAL DISEASES

Dr. Lind was surgeon in the royal navy in the eighteenth century. He was founder of naval hygiene in England and is noted particularly for the measures he brought into effect to abolish scurvy from the navy. In Lord Anson's expedition of 1740, seventy-five per cent of the sailors developed the disease; in 1779 the Channel Fleet had 2,400 cases of scurvy in ten weeks. Lind's recommendation to use fruit juice to prevent the disease was put into effect in 1795, and thereafter there were no more cases of scurvy in the navy. He also devised a method of distilling sea water for drinking purposes.

But even in those early days men were beginning to have some idea of the cause of scurvy. Thus, the son-in-law of William Shakespeare, John Hall, a physician of Warwickshire, published a book, in 1657, called *Selected Observations on English Bodies, or Cures*

Both Empirical and Historical, in which he described how he had cured scurvy by means of a brew, a sort of root beer made from scurvy grass and water cress. His book did not attain the popularity gained by the works of his famous father-in-law, and to the loss of many lives.

William Harvey, the great physician who first demonstrated the course of the circulation of the blood, recommended lemons for the prevention and cure of scurvy, but he thought that the beneficial effects came from the acid of the fruit. It was Dr. James Lind, an English naval surgeon, who in 1747 performed the crucial experiment which demonstrated that it was not acid, but some peculiar quality in the fruit itself, that brought about the cure. His experiment was not on rats, but on men. Twelve men with scurvy were all given the same diet, except that for some, vinegar was added, for others, diluted sulphuric acid, and for still others, oranges and lemons. Only those who received the fruit recovered.

Lind recommended that fruit juice be concentrated, bottled, and issued to the sailors during long cruises. But it was a generation or more before his advice was followed. In the meantime Captain Cook, the discoverer of the South Sea Islands, undertook his famous voyage of three years. Only one of his men died, and he not from scurvy. He issued to his crew an infusion made of sprouted barley. But scurvy continued on in the navies of the world; it was not until 1795 that the English navy finally followed Lind's suggestion of using fruit juice to prevent the disease, and it was not until 1854 that a law was passed requiring a similar addition to the diet of the men in the merchant marine. It was because of this dole of citrous-fruit juice that the men of the English navy have been dubbed "lime juices" or "limeys." That district of the London waterfront where the fruit was stored is now known as Limehouse.

Scurvy still exists today, although it occurs only occasionally. There are still some people who try to live on a diet similar to that of the sailors of bygone days, a diet of salted and dried meat, flour, and coffee, with no fresh or canned vegetables, fruits, salads, or milk. Then, also, there is another group which sometimes suffers from scurvy—the babies. Infants are at the mercy of the dietary knowledge of their elders. Babies can ask for more, but not for

better, food. And sometimes milk alone will not prevent scurvy; fruit and vegetable juices are required, in addition. And always the physician's advice is needed in determining the diet for the baby if it is to be raised on a bottle.

This mysterious something in fruit and vegetables, which prevents scurvy, is known now as a vitamin. We know, also, that there are many similar substances that prevent other diseases. Already five, and possibly six, have been discovered. Each one is necessary in the diet, for health and growth.

Practically all of this dietary knowledge is a development of the twentieth century. But no longer is the experimental work carried out on men; instead, rats are used. There is one exception to that statement; it has to do with the disease, beriberi and the work of the Japanese naval surgeon, Takaki. Beriberi was once prevalent among the men of the Japanese navy and army. Those affected had intense pains in the legs and arms, a sort of neuritis that led to paralysis, and in time their hearts became affected and they died.

The disease did not resemble scurvy, but, nevertheless, Dr. Takaki thought that it might be due to some deficiency in the diet of fish and polished rice to which the men were limited. So he changed the diet to a more varied one, and beriberi ceased to occur. Later it was shown that rice polishings—the thin hull removed in milling rice—would prevent the disease. Rice hulls, then, were one of the sources of a substance which would prevent beriberi.

A chemist named Casimer Funk, working in the laboratories at Cambridge, England, tried to isolate the substance in pure form from rice hulls. He obtained crystals which in small amounts cured beriberi. The substance was one that chemists called an amine, and, to distinguish it from others, he attached the prefix meaning, life, *vita*; hence, *vitamine*. Unfortunately, as later experience showed, Dr. Funk had not isolated the pure substance. He had obtained the curative principle mixed with other materials. It was not an amine, but the word *vitamine* retained its hold. And so to salve the consciences of scientists, the final "e" was dropped and the word spelled *vitamin*, a term with no chemical significance.

In telling of the derivation of the name I have gone ahead of my story, for when the term was coined, several of these necessary

dietary factors had already been discovered. The new name was simply applied to all of them; the separate ones were then differentiated by letters, vitamins A, B, C, and now, vitamins D and E, and, possibly, F.

The nutritional work along the lines which have in the last few years been so productive of discovery was commenced by Professor Russell Chittenden of Yale. In 1898 he studied the need for protein in the diet, and the question arose as to the relative merit of proteins derived from various animal and vegetable sources. To this end, Dr. Lafayette Mendel of Yale, and Dr. Thomas Osborne of the Connecticut Agricultural Experiment Station, fed rats chemically pure foods as did, also, Dr. F. Hopkins of Cambridge.

These investigators soon found that rats could not be made to grow, or even live, on highly purified foods, although every constituent of a normal diet then known, was represented. But the addition, to the diet, of a little milk or the juice of certain vegetables, enabled growth and development to take place in a normal fashion.

Here, then, was a way of finding out in what foods these growth-promoting, disease-preventing substances occurred. Did this material or that contain the vitamins which, if added to a diet of chemically pure foodstuffs, would allow a rat to grow and keep well? The answers to these questions, derived from a long series of experiments, have given us our modern knowledge of vitamins.

The one called A, first demonstrated by Drs. McCollum and Davis of Johns Hopkins, was found plentifully in milk and butter and egg yolk, and in tomatoes and green vegetables. When young animals do not have these vitamins in their diet, they cannot grow and develop. Then came vitamin B. Its absence, likewise, interferes with growth and allows the disease, beriberi, to develop—the disease that affected the Japanese navy because of their diet of polished rice. This vitamin is widely distributed in whole cereals, vegetables, and fruits. Present investigations indicate that there is more than one vitamin covered by the symbol B for it appears that merely a part of the present vitamin B prevents the disease pellagra.

It was the absence of vitamin C that gave the explorers so much trouble. It is the one that prevents scurvy. But if there had been infants on those explorations, there might have been other dietary

diseases besides scurvy, for young people need especially vitamins A and D.

This vitamin D was once a part of A, but has now been separated. It is the one that prevents rickets, a bone disease of children. This vitamin has particular interest for us, because it is the only one that we can manufacture either in the body or in the chemical laboratory. All other vitamins are derived, directly or indirectly, from vegetables and fruits. Those that we get from meat or milk, the animals have, in turn, obtained from the vegetable material they ate. But vitamin D is formed in the body by the action of sunlight on the skin, the ultra-violet or invisible light of the sun. In northern cities there is very little ultra-violet light in the winter time, and so the physician often recommends the addition of vitamin D to the diet of his infant patients. Cod-liver oil was once the richest source of this vitamin, but now it can be prepared artificially, the only vitamin that, at present, can be synthesized.

Other than vitamin D, the physician rarely finds it necessary to add vitamins to the diet as medicaments; all the others can and should come from the grocery store, the meat market, and the milkman. And vitamin E, well, we don't need to worry too much about that one yet in the American homes. When it is absent from the diet of rats they gradually become sterile and unable to have offspring. A little lettuce cures this difficulty so unusual among rats.

Certainly, except for the vitamin that prevents rickets in the babies of northern climates, we need never treat them as medicaments if we observe the simplest rules of dietary choice. The first is that on our tables we have plenty of vegetables, canned or fresh; plenty of salads (they do not need to be an expensive kind, for cabbage is rich in vitamins); and fruit, not necessarily an exotic variety; and milk.

We have become vitamin-conscious in the last few years, and properly so, but the exploitations of vitamin foods, advertised as such, have left some people with the impression that the more vitamins they eat, the more health and vigor they will obtain. Such is not the case. Without sufficient vitamins the body cannot grow or function properly. It becomes diseased. Likewise death occurs if water is not taken. But nobody, I am sure, would ever believe that

deliberately drinking a great quantity of water would make him vigorous. A certain amount is needed, but beyond that, the excess serves no purpose. The same is true of vitamins.

Furthermore, by focusing attention on vitamins we are apt to overlook another fact; minerals and proteins are as essential in our diet as are vitamins. If we obtain our vitamins from natural sources—meat, butter, eggs, fruit, and particularly milk and the leafy vegetables—we obtain, at the same time, the required amount of the other constituents of a normal diet; and they are as important in maintaining health and preventing disease as are the vitamins.

CHAPTER TWENTY

ANTOINE LAURENT LAVOISIER



QUITE often physiologists and the physicians disagree, but rarely does their difference of opinion rise to the point of conspiracy of murder. Yet one of the greatest physiologists that ever lived, Antoine Laurent Lavoisier, the man who told us why we breathe and who named the gas we breathe, oxygen, was condemned to death by one physician and executed on a machine invented by another. The saving grace in the situation, at least from the medical point of view, was that the difference in opinion in this strange triangle was not physiological—it was political.

Antoine Lavoisier lived and worked, in the latter part of the eighteenth century, in France. The industrious laboratory worker of today would call him a dilettante in science, for his interests extended far and wide. He revised the French banking and insurance systems, worked out a code of taxation, led the way in scientific agriculture, and held the office of farmer-general. In his spare time he laid the very foundation for all modern studies in respiration.

But it was his political activities that brought him to the unfavorable attention of a medical confrère, one Dr. Jean Paul Marat. In view of striking pictures of Marat's life as a rough, red republican, screaming his denunciations through the pages of his surreptitiously-printed paper, we are apt to forget his medical and philosophical attainments. At one time he had a wide and aristocratic practice under the patronage of the Comte d'Artois. But he gave up this lucrative position to devote himself whole-heartedly to florid politics. Thereafter, his paper flung its denunciations at all organized authority, subject to interruptions only as its owner beat a hasty retreat to London or to the Paris sewers, whichever was more expedi-

ent at the moment. He rose to denounce the farmers-general, and he led the revolutionary tribunal that condemned to death the aristocratic Lavoisier. Marat's charge was that the tariff wall, the *octroi* erected at Lavoisier's suggestion, stopped the circulation of air in the city.

With the condemnation made, the second physician appears on the scene, one Dr. Joseph Ignace Guillotin, whose contribution to humanity bears his name—the guillotine. He invented, or revived, the use of this machine of execution, in the interest of preventing suffering, so he said, and certainly in the interest of the good republican belief that if men were born equal, there should be no distinction in the manner of their deaths.

And so, in 1794, the final act of this medical-political situation was achieved, and Lavoisier's head lay in the basket of *la petite Louison* of Dr. Guillotin. Of his death, Legrange said, "It took but a moment to cut off that head, though a hundred years, perhaps, will be required to produce another like it."

The great facts that Lavoisier established every schoolboy knows today, for they are the most elemental truths about breathing; but before Lavoisier's time, no man knew why we breathe or what happens to the air we draw into our lungs. Men before him knew that breathing is necessary to life, and scientists had shown that it is not the movement of the lungs that is necessary, but merely the passage of air through them. They knew, also that some strange reaction occurs between the air in the lungs and the blood flowing through them, for the blood comes there dark red, and flows away bright red. They had shown that when a flame is burned in the air of a tightly closed vessel, something is taken from the air, so that it is no longer good for animals to breathe; and, likewise, that when an animal has breathed the air in a tightly closed vessel for a long time, the air is changed in some way so that it will no longer support the flame of a candle.

Joseph Priestley of England, who, like Lavoisier, tried to combine politics and physiology, with the even more unfortunate addition of religion, fled to this country after his attempt. In Northumberland, Pennsylvania, he continued his experiments in physiology, and showed that the air which has by a flame been rendered unfit for

animals can be restored and made suitable again by growing plants in it.



THE ASSASSINATION OF MARAT

Marat was a physician. He practiced in London and in Paris. His writings are both medical and philosophical, ranging from a work on venereal diseases to the *Philosophical Essay on Man* which exasperated Voltaire and whose attack drew attention to Marat. The Comte d'Artois, afterward Charles X, appointed Marat physician to the guard and Marat developed an aristocratic practice. He resigned his position in 1786 and devoted himself to philosophy and politics. His career as a violent republican and publisher of the papers, *Ami du peuple*, and the *Journal de la république française* is more widely known than are his medical attainments. At times the reaction to his revolutionary sentiments forced him to hide in the Paris sewers; an infection said to have been acquired there was rapidly ending his life, when in 1793, Charlotte Corday entered his room and stabbed him. At the time he was sitting in a shoe-shaped tub of hot water, the only measure that brought relief from his pains. His ashes were transferred to the Pantheon in September, 1794, by his enthusiastic followers, and cast out from there in the following February.

But it was Lavoisier who took all these separate observations and brought system to them. He showed that, whereas nearly four-fifths of the volume of the air consists of inert gas, one that cannot

be used to support life—the gas we now call nitrogen—the remaining fifth is the substance necessary to maintain life, the gas that he called oxygen. When a man breathes air into his lungs, he uses up part of this oxygen and returns in its place still another gas, the one we call carbon dioxide. Lavoisier went on to show further that when carbon, such as charcoal, is burned in air, the same process occurs in the combustion—oxygen from the air is used up and carbon dioxide formed.

In short, he showed that the process of living is one of burning food in the body. Carbon and also hydrogen from the foods we eat are burned, that is, oxidized, in our muscles and other tissues. The energy from this combustion appears as the heat which keeps our bodies warm and, also, as the work and movement which our muscles perform. The oxygen necessary for the chemical reaction, or combustion, is obtained from the air we breathe in, and the carbon dioxide formed is discharged with the air we breathe out. The oxygen is carried to the tissues by the blood, which circulates through the lungs, taking on the oxygen and, in further progress, delivering it to the tissues. In returning to the lungs, in the round of the circulation, the blood carries back the carbon dioxide formed and discharges it as a waste product.

The principles set forth in Lavoisier's work were the fundamental ones of respiration, but, alone, they were only part of the whole problem. Details and elaborations were to follow, but already many practical problems could have been answered. Why was it that men collapsed and fell unconscious at very high altitudes, even though a candle might burn there? Why did deep-sea divers suffer pain and sometimes die when brought up from the ocean bottom, although they did not suffer while they were at work there?

Repeated analyses of air at high altitudes have shown that it contains the same percentage of oxygen as the air at sea-level, but there is this difference: the air at high altitudes is at a lesser pressure, and it is pressure that forces the oxygen into its combination with the blood. At low barometric pressure, the blood carries less than the normal amount of oxygen, and, in consequence, the tissues are starved. The muscles and brain fail in their actions, and paralysis and unconsciousness result.

In 1875, the French physiologist, Paul Bert, conducted a balloon ascension in which he provided means of solving this difficulty by giving each of his three observers—Tissandier, Sivel, and Crocé-



*BAINS chauds , gratis , pour les Pauvres ,
établis sur la Rivière , sous la protection du Bureau
de la Ville de Paris.*

*J*E soussigné , Docteur en Médecine , certifie , que
la nommée *Marie Antoinette Gu*-demeurant
rue *du Petit-Pont* - Paroisse *St. Severin*
a besoin de prendre *trente* Bains de Rivière ;
dont un chaque jour , ou deux jours l'un , suivant l'effet.
& j'estime que sa fortune ne lui permettroit pas d'en
faire la dépense.

A PARIS , ce *cinq Juillet* 1792.
Guillotin D.M.D.

THE AUTOGRAPH OF DR. GUILLOTIN

During the French Revolution, Dr. Guillotin brought into use the instrument of execution which bears his name—the guillotine. He is generally credited with inventing this machine, although there is evidence that one of similar construction had been used in Germany a century or more previous, but there is no reason to believe that Dr. Guillotin knew of it.

Spinelli—bags filled with pure oxygen; they were to breathe this gas instead of the rarefied air. The same principle is applied successfully in modern airplane flights to high altitudes, but Paul Bert's balloonists were unfortunate. The effects of the high altitude crept on them so slowly that they were all paralyzed before they

realized their danger. The balloon carried the unconscious men to 30,000 feet, and when it descended, two were dead.

There is quite a different problem for divers and caisson workers; it concerns the inert gas in the air, the nitrogen. There is plenty of oxygen pressure—more than enough—in the compressed air they breathe, but there is also an increased pressure of nitrogen. Although the body cannot use this gas, it nevertheless becomes dissolved in the blood and flesh. In the compressed air, the body absorbs nitrogen, and when the air pressure is reduced, the nitrogen is given off. Now, there is no harm in this exchange of gas provided the discharge of the nitrogen is sufficiently slow, so that bubbles do not form in the blood—bubbles like those that separate in carbonated water, when the cap of the bottle is removed. Bubbles of nitrogen in the blood interfere with its flow; suffering and even death may result. On the basis of this knowledge, divers are now brought up from great depths in slow stages so that they may rid themselves of the excess of nitrogen, without harm.

Again, the simple principles of respiration show us how a certain very common type of gas poisoning comes about. It was Paul Bert, he who supervised the unfortunate balloon ascension, who first demonstrated that a gas other than oxygen is capable of combining with the red coloring matter in the blood and rendering the blood unable to carry the needed amount of oxygen to the tissues. This gas is carbon monoxide, the one that renders smoke, illuminating gas, and the exhaust from automobiles, poisonous. The inhaled carbon monoxide displaces the oxygen in the blood; and if enough of the gas is inhaled, there results a condition similar in every effect to that from which the balloon companions of Tissandier suffered—paralysis, unconsciousness, and death. Fortunately, if death has not already occurred and the victim is brought to fresh air, the carbon monoxide slowly leaves the blood and is replaced by oxygen. With modern methods of resuscitation, most of the harmful effects of this gas poisoning can be obviated, if the man is still living when found.

But before I say any more about this resuscitation, I want to return to one of the points that Lavoisier brought out. A man takes in oxygen, but breathes out carbon dioxide as a waste product. What,

then, was more natural to assume than that this carbon dioxide so ejected must be a very undesirable thing to have in the body? And from this belief there rose the idea, held until recent years, that bad air—that which occurs in rooms where many people are breathing—is due to the accumulation of exhaled carbon dioxide.

For a long time the effectiveness of ventilation was judged on the basis of the amount of carbon dioxide present. Two per cent of carbon dioxide in the air breathed is barely appreciable; even much higher percentages are harmless. Under conditions of the worst kind of ventilation it rarely attains more than a fraction of one per cent. Modern studies have shown that the effects of bad air, except when containing poisonous gases such as carbon monoxide, are confined solely to the skin and that bad air may be made into good air merely by stirring it and cooling it.

In fact, so far has the pendulum swung away from the idea that the carbon dioxide found in the body is a poison, that this gas is now recognized as one of the most necessary constituents of the blood. It is the factor which controls breathing. The volume of air breathed is not a matter of chance; it is precisely regulated to the body's needs for oxygen. At rest, when we are burning only a little food in the body, breathing proceeds slowly, but when we exercise and thus burn a greater amount of food, we must breathe a proportionately greater volume of air. The regulation is brought about by means of the carbon dioxide. In the brain there is a very delicate nerve center which controls the movements of breathing, and this center responds instantly to any change in the concentration of carbon dioxide in the blood. Thus, when we exercise and more carbon dioxide is produced, the amount of this gas in the blood is raised slightly; the center in the brain is affected; breathing is increased. When the exercise is completed and we rest, the deep breathing continues for a time and then gradually diminishes to the resting level, as the excess of carbon dioxide is carried away.

If there were no carbon dioxide in the blood, we should cease to breathe. But if we inhale air containing five or six or seven per cent of carbon dioxide, our breathing behaves just as if we were performing exercise, although under such circumstances our muscles,

except those of breathing, are not made to work, nor is the blood called upon to carry a large quantity of oxygen.

It is this principle of stimulating breathing by inhaling carbon dioxide that forms the basis for the measures of resuscitation now applied in cases of gas poisoning. They originated in this country and came from the work of Professor Yandell Henderson, at Yale University. Nor does their application cease with gas poisoning;

*Sanctdy - 18th à cheval à 9^h $\frac{1}{2}$ au lieu de l'ordinaire.
 Dimanche - 19th à 4^h après le dîner.
 Lundi - 20th à cheval.
 Mardi - 21th depuis le matin arrive et arrive à l'école à 11^h $\frac{1}{2}$.
 Mercredi - 22th depuis le matin à 8^h $\frac{1}{2}$ de 5^h à 11^h $\frac{1}{2}$ arrive à
 11^h $\frac{1}{2}$ à cheval y arrive et arrive.
 Jeudi - 23th à 11^h $\frac{1}{2}$ on a interrompu la classe pour passer à 11^h $\frac{1}{2}$
 de 11^h $\frac{1}{2}$ à cheval dans le jardin. (Pour les communiants
 de l'Assemblée après le dîner à 11^h $\frac{1}{2}$ après le dîner
 d'après les heures dans un feuillet arrive à 11^h $\frac{1}{2}$.
 Vendredi - 24th depuis le matin à 8^h $\frac{1}{2}$ dans la forêt sans feu, arrive
 à 11^h $\frac{1}{2}$ à 10^h y arrive et arrive. à l'école.
 Samedi - 25th depuis le matin à 8^h $\frac{1}{2}$ arrive à l'école sans arrive à 8^h $\frac{1}{2}$.
 26, 27, 28, 29, 30, rien la classe dans la Galerie.*

FRAGMENT OF A JOURNAL IN THE HANDWRITING OF LOUIS XVI

they have been carried over into the hospital and the home, for these same resuscitative measures afford the modern means of making babies breathe at birth and preventing them from developing pneumonia during the first weeks of life; they are also applied after anesthesia, to hasten recovery, and, likewise, to prevent pneumonia, after operation.

In poisoning from carbon monoxide, and also in drowning, there is an additional important measure of resuscitation. Sometimes the victim has stopped breathing when he is found, but that fact does not signify that he is dead. Both gas poisoning and drowning shut off the supply of oxygen, although each in a different manner. If

this condition of asphyxia, as it is called, is very severe, breathing stops, but the heart continues to beat for possibly ten or twelve more minutes. If breathing can be reëstablished, life can be saved, but breathing does not return of its own accord, and, consequently, the asphyxia continues and the heart finally fails, unless resuscitative measures are applied immediately.

To restore breathing, so-called artificial respiration is used, and the only effective measure in practical application is the manual method; the so-called Schäfer prone-pressure method, introduced some twenty-five years ago by an English physiologist.

Training in this first-aid procedure has been extensive in this country, particularly among the Boy Scouts and the men of the police and fire departments. It is estimated that 14,000,000 people have been trained in this method. To save life, artificial respiration must be applied at once and continued possibly for a long period, even three, four, or five hours. The inhalation of oxygen and carbon dioxide greatly expedites the return of spontaneous breathing, and, as I have said, obviates pneumonia and other complications that may follow the poisoning. Most of the fire and police departments of our larger cities have inhalators to supply this resuscitative treatment.

Recently, these same resuscitative methods have come in to save the lives of newly-born babies. Lavoisier's principles, furthered by modern medical research, have found their way into the delivery-room. Some four per cent of babies fail to breathe when they are born; others develop pneumonia. As Professor Henderson has shown, many of their lives could be saved—and many are being saved—by resuscitation with carbon dioxide inhalations.

Part Five

CAPTAIN OF THE MEN OF DEATH

CHAPTER TWENTY-ONE

THE KING'S EVIL



IN THE seventeenth century there lived in England a polished and courtly gentleman by the name of John Evelyn. He kept a dairy. There is nothing unusual about the mere fact of his having kept a diary; many people have indulged in that practice and some have even gone so far as to have them published. The importance of Evelyn's diary comes from the fact that he had something worth saying. In excellent language he presented an intimate and detailed picture of the events occurring in his lifetime; these events were of general interest. He was acquainted with most of the prominent men of his time; he held official positions; he had an *entrée* into court. Many of his pages are given to descriptions of court scenes: the reception of ambassadors, the tragedies and scandals of court life, and the personalities of the famous men he encountered. He was a friend of the great architect, Sir Christopher Wren, who designed St. Paul's Cathedral of London; according to his advice he built a magnificent home, with a garden, surrounded by a beautiful hedge of holly. John Evelyn was a prominent citizen and this home was one of the show places of England. Consequently, when the Tsar of Russia, Peter the Great, came to England to learn shipbuilding, Mr. Evelyn's house was put at his disposal for his entertainment. The owner subsequently collected a considerable sum from the English treasury to repair damages done to his property, for the Tsar's favorite recreation was to ride in a wheelbarrow, full tilt, through the famous holly hedge.

The first entry in Evelyn's diary very logically is: "I was born about twenty minutes past two in the morning, being on Tuesday, the 31st, or last, of October, 1620." The last entry was made a few

days before his death: "My indisposition increasing; I was exceedingly ill this whole week." It is dated January 27, 1706. The diary

The Bill of Mortality, Price of Stocks, &c. 707			
Stocks.	Monthly B. I. L. of Mortality from Nov. 26. to Dec. 24.	Buried.	
6. Sea Tre. 83 $\frac{1}{2}$	Christned Males 635 $\frac{1}{2}$	Within the walls. 161	
—Annuities 105 $\frac{1}{2}$	Christned Femal. 625 $\frac{1}{2}$	Without the walls. 330	
—ditto Nov 105	2 Males 876 $\frac{1}{2}$	In Mid and Surry. 746	
3 per Ct. Ann. 94 $\frac{1}{2}$	Buried 2 Femal. 954 $\frac{1}{2}$	City and Sub of Well 403	
—Bonds 36. 161.		1350	
Bank 139	Died under 2 Years old --- 691	Weekly Burials.	
—Circulation 5/005	Between 2 and 5 --- 180	Dec. 1 490	
India 149	Between 5 and 10 --- 55	10 468	
—Bonds 4/ 12.	Between 10 and 20 --- 56	17 411	
3 per Ct. dit. 27. 82.	Between 20 and 30 --- 128	24 432	
Million Bank 107	Between 30 and 40 --- 161	1810	
Equivalent 105	Between 40 and 50 --- 148	Prices of Goods as before.	
African 28	Between 50 and 60 --- 164	Wheat 10s. 10 36s. od.	
Royal Aff. 98 $\frac{1}{2}$	Between 60 and 70 --- 108	Rye 3s. 10 16s. od.	
London Aff. 12 $\frac{1}{2}$	Between 70 and 80 --- 77	Barley 13s. 10 16s. od.	
York Buildings 4	Between 80 and 90 --- 54	Pale Ale 11s. 10 23s. od.	
English Copper 27.	Between 90 and 100 --- 8	B. Ale 18 s. 10 20s. od.	
	1830	Oats 12s. 10 19s. od.	
		Peas 19s. 10 21s. od.	
		H. Peas 15s. 10 19s. od.	
		H. Beans 15s. 10 19s. od.	
		Tares 20 s. 10 23s. od.	

CHRISTNINGS and BURIALS from December 12, 1733, to December 10, 1734.

Christned 17,650	Males 8575	Buried 26,565	Males 13,016	Decreased in the Burials this Year.	3171.
	Females 6675		Females 13,046		
Died Under 2 Years of Age 10751	20 and 30 1718	60 and 70 1324	101	1	
Between 2 and 5 3830	30 and 40 2212	70 and 80 723	104	2	
5 and 10 1223	40 and 50 2118	80 and 90 452	106	1	
10 and 20 829	50 and 60 1669	90 and 100 66	100	2	

THE DISEASES and CASUALTIES this Year.

Aberrive and Silbora	cough	239	Impothume	36	St Anthony's Fire	6	
Aged	661	Diabetes	2	Inflamun	31	Solid Head	2
Age	1459	Droopy	998	Ich	2	Sciatica	2
Age	6	Evil	39	Leprosy	6	Scurvy	2
Apoplexy and sudden	Falling Sickness	1	Lethargy	9	Small-pox	4658	
Althum and Tiffick	Peters, and Purp	3116	Livergown	8	Sores and Ulcers	36	
Red-riden	5	Fiftula	16	Lunatick	22	Splen	4
Bleeding	8	Flux	24	Meflica	20	Stoppage in the Sm	1
Bluddy-Burn	13	Freak Pox	103	Micarrige	191	Surfet	1
Borlen and Rupture	21	Gout	44	Mortification	191	Swelling	4
Cancer	48	Gravel, Stone, & Sten-	36	Palfy	1	Teeth	1316
Canker	12	guy	12	Pine-Fluck	38	Thrush	99
Childbed	271	Grief	12	Pleuify	31	Tympany	2
Quick and Twilling of	Gripping in the Guts	200	Quinfy	3	Vapours	1	
the Guts	321	Hæmorrhoids, Hem-	Ruff	11	Vomiting & Loofna	10	
Conlampon	4159	hoehed, and Water	Rheumatism	82	Worms	10	
Convulsion	8297	in the Head	116	Rickets	1	Qualities	447
Coughs and Hooping-	Juandit	116	Ring of Lights	18			

Our Readers are desired to take Notice, that in a few Days will be published, Price 6d. A Supplement to the Gentleman's Magazine, 1734. wherein the Debates of the last Session of the Parliament will be concluded, with a General Title, copious Indexes, &c. without which the Year's Volume will not be complete.

The Gowney Gentleman, who in the most urbane and elegant Letter, wishes us many happy Months, may be assured, we not only wish him and all our Readers the same, but shall do our utmost to make 'em so, in the way he so kindly speaks of; and that we may not fail of Success, we hope and request the Continuance of his Favour, particularly that he will oblige us with two more Epigrams, there being requir'd for the Gentleman's Price.

A PAGE FROM THE "GENTLEMAN'S MAGAZINE" OF 1734

Presenting a statistical compilation of bills of mortality for London in the year 1734. The "evil" mentioned is scrofula; "teeth" covers almost any form of death occurring under the age of two years, except those accompanied by convulsions; of the former 1,316 deaths are reported, and of the latter 8,295. Aside from these diseases of childhood, consumption with 4,139 deaths, leads the list, followed by smallpox with 2,688 deaths. Six deaths from leprosy are recorded, and four from St. Anthony's fire, a name variously given to a disease resulting from eating bread made from rye blighted with the fungus ergot and to erysipelas. The recording of 1,459 deaths from old age meant then, as it does now, that the actual cause was not known. In spite of the fact that there were 3,711 fewer deaths in 1733 than in the previous year, the births were nevertheless more than 8,000 less than the deaths.

thus covers a span of eighty-five years during one of the most tumultuous periods of English history. In these years, Charles I was

beheaded, Cromwell rose and ruled, and Charles II was exiled and restored. James II came to the throne, only in turn to be exiled and replaced by William of Orange. He in turn was followed by Anne, the last of the Stuart sovereigns.

Here are two brief entries from the diary concerning the activities of Charles II. The first of these is dated May 29, 1660:

This day, his Majesty, Charles the second, came to London, after a sad and long exile . . . being seventeen years. This was also his birthday, and with a triumph of about twenty thousand horse and foot, brandishing their swords, and shouting with inexpressible joy; the way strewed with flowers, the bells ringing, the streets hung with tapestry, fountains running with wine. . . . Lords and nobles, clad in cloth of silver, gold and velvet; the windows and balconies, all set with ladies; trumpets, music and myriads of people . . . so that they were seven hours in passing. I stood on the Strand and beheld it, and blessed God. And all this was done without one drop of blood shed and by the very army which had rebelled against him.

People carried out their ceremonies well in those days. Our modern receptions lack glamour. You are all familiar with the details of the presentation of the key to the city, the platitudinous speech of thanks over the radio, the ride through the streets with a motor-cycle escort, the shower of waste paper from the windows of the tall buildings, and then the business-like untangling of the traffic congestion. It is only a momentary interruption in the activities of a busy day—efficient but not glorious.

The pomp and ceremony of bygone days were carried even into the medical clinic. A little more than a month after his restoration, Charles ordered the announcement made public that on July 6 he would touch the sick for the king's evil. Mr. Evelyn was present at the ceremony, and here is his description of it.

His Majesty began to touch for the Evil according to custom, thus: His Majesty sitting under his state in the banqueting house, the surgeons cause the sick to be brought, or led, up to the throne, where they kneel; the King strokes their faces or cheeks with both hands at once, at which instance a chaplain in his formalities says, "He put his hands upon them, and he healed them." This is said to every one in particular. When they have been all touched, they come up again in the same order, and the other chaplain kneeling, and having angel gold strung on white ribbon on his arm, delivers them one by one to His Majesty, who puts them about the necks of the touched as they pass, whilst the first chaplain repeats, "That is

the true light who come into the world." Then follows an epistle with liturgy, prayers for the sick, lastly blessings; and then the Lord Chamberlain and the Comptroller of the Household bring a basin, ewer, and towel, for His Majesty to wash.

It was a very impressive ceremony, which no doubt affected the sick deeply. On the proclaimed days they gathered from the slums, the countryside, and even from the mansions of the city. They were brought before the King, seated among his assembled court. State officials and divines dressed in full regalia stood solemnly at his side. As the sick were presented to the King he touched them and hung about their necks golden coins suspended on ribbons. They went away rejoicing, and most of them to die soon of their illness.

What the King was conducting was a tuberculosis clinic; the king's evil was scrofula, tuberculosis of the lymph glands, particularly those of the neck. The disease was once very prevalent, and the people affected were badly deformed by the scars from the chronically discharging abscesses. There was no treatment for the disease except the superstitious and useless ceremony of the Royal Touch. It is difficult to realize today how very prevalent and commonplace in bygone days were these terrible, chronic diseases and horrible deformities.

Shakespeare in "Macbeth" has left a vivid picture of the unfortunate people who in his day had scrofula and who, it was assumed, were cured by the Royal Touch. However, no one then went to the trouble to find out if they were really improved. To do so would have been disrespectful to the king; in 1684, Thomas Rosewell was tried for high treason for speaking disparagingly of the Touch. Here is what Shakespeare says:

. . . Strangely-visited people,
All swoln and ulcerous, pitiful to the eye,
The mere despair of surgery, he cures;
Hanging a golden stamp about their necks,
Put on with holy prayers.

The Royal Touch for the king's evil was believed to be evidence in proof of the divine right of kings. In ancient times the personal power of healing was always an attribute of the gods. The gods were supposed to bring sickness, and only the gods could take it

away. By a logical development the healing power was extended to the representatives of the gods; first, to the holy man and later to the king. Just why the French and English kings, in their assertion of divine power, chose scrofula as the one disease upon which to exhibit their prerogative is not certainly known. But it has been suggested that scrofula in the extreme forms in which it was manifest in their days bore a resemblance to leprosy. And leprosy had always been a disease set apart from all others and left exclusively to the treatment of divine representatives. The Bible in Leviticus xiii: 9, says, "When the plague of leprosy is in a man, then he shall be brought unto the priest." And again in Luke v:12, 13, "When Jesus was in a certain city, behold a man full of leprosy; who seeing Jesus fell on his face, saying, 'Lord, if thou wilt, thou canst make me clean.' And Jesus put forth his hand, and touched him, saying, 'I will: be thou clean.' And immediately the leprosy departed from him."

Edward the Confessor, who reigned in the eleventh century, introduced the Royal Touch into England, but it was not until the time of Henry VII, in the fifteenth century, that the practice was made into an elaborate church ceremony. The ritual is to be found in the liturgies of the time; it continued in the Book of Common Prayer of the Church of England until 1719, when it was quietly removed.

The presentation of the gold coin as a part of the ceremony added greatly to its popularity among the people. The outlay of coins sometimes rose as high as fifty thousand dollars a year, and after the time of Queen Elizabeth they were reduced in size as a measure of economy. The fact that each applicant for treatment was required to take oath that he had not previously been touched had a bearing on both the monetary incentive and the inefficiency of the treatment.

Charles II was the busiest of all the royal touchers. One day in 1684 the crowd applying for treatment was so great that six or seven of the sick were trampled to death. It is noteworthy that more people are said to have died of scrofula in the time of Charles II than at any other period of English history.

William of Orange, who came to the throne in 1688, refused to

continue the practice of the Royal Touch, and in consequence the people accused him of cruelty. Only on one single occasion was William importuned into laying his hands on a patient. "God give you better health," he said, "and more sense."

The Manner of His Majesties Curing the Disease, CALLED THE K I N G S - E V I L.



London Printer for Dorman Newman at the Kings Arms in the Pauls St. E. H. Van der Schuer

KING CHARLES II TOUCHING FOR THE EVIL

A portion of a broadside printed in 1679 showing the ceremony of the royal touch for the king's evil. For the instruction of applicants for treatment there was attached a printed description of the ceremony. It concludes with the optimistic statement: "Which being ended, the healed persons depart, first giving thanks to God and to the King's Majesty, and congratulating one another upon their recovery." Charles II was the busiest of all the royal touchers, but the bills of mortality issued during his reign show that more people died of the evil then than in any previous or subsequent period.

Queen Anne, however, who followed him to the throne, was a superstitious woman, and she at once revived the practice, the last of the English royalty to do so. The famous lexicographer, Dr. Samuel Johnson, was one of the last persons touched for scrofula by Queen Anne. He was a little over two years old at the time, but his biographer, Boswell, records the fact that the scrofula persisted throughout his life. On at least one occasion Queen Anne

had to issue a royal proclamation postponing the ceremony, for, as a chronicler of the time says: "Her Majesty did not touch, yesterday, for the Evil, as designed, having gout in her hands."

The practice continued longer in France than in England. In 1775, Louis XVI, the last king before the great Revolution, touched twenty-four hundred sick persons on the day of his coronation. But the more enlightened men of that time were becoming a trifle skeptical of the efficacy of the treatment and also of the whole doctrine of the divine rights of kings. An investigation was subsequently carried out on these twenty-four hundred cases. It showed that in only five were there any indication of improvement.

Even to the last, however, the Royal Touch was an impressive ceremony. On that day in 1775, only a little more than a hundred and fifty years ago, Louis rode to the Abbey Park, mounted on a beautiful white charger, surrounded by magnificently dressed princes and courtiers, and preceded by a detachment of musketeers and guards. The sick were assembled in a row. The king dismounted and went through the ceremony of touching them. Then came the elaborate ritual of the king washing his hands. Three princes of the blood extended to him, in turn, beautifully embroidered napkins dipped in vinegar, water, and perfume.

The Royal Touch for scrofula impressed the patient, but it did not affect the tubercle bacilli which we now know are the cause of the disease. Bacteria have no faith and they have no superstition. The tubercle bacilli which cause scrofula also cause consumption, or tuberculosis of the lungs, but in scrofula the bacteria are centered primarily in the lymph glands, usually those of the neck. They frequently spread, however, from their original focus, and the disease then extends to the lungs, causing the more serious form of tuberculosis.

The bacteria which cause tuberculosis get into the mouth from infected milk or from contact with people who have consumption. The measures of general preventive medicine—sanitation and public health—which are designed primarily to control the spread of the disease bacteria have been successful in greatly reducing the prevalence of tuberculosis. But the disease is, nevertheless, very common; we are still exposed to the infection, although not so fre-

quently as formerly. In 1904 there were some 240,000 deaths from tuberculosis in the United States; in 1929 the figure had fallen to 92,000, but nevertheless the disease is the leading cause of death between the ages of 15 and 45. Consequently each individual must be on continual guard against the insidious development of the disease. The wide prevalence of tuberculosis in its serious forms indicates that this personal prevention is greatly neglected. The reason lies in the fact that there is no immediate and evident incentive for the necessary coöperation with the physician.

When we are sick and suffering we seek medical aid, but when we seem healthy and feel well we are inclined to let the matter rest there and disregard the preventive measures that insure continued freedom from disease. We gamble with our health. What is infinitely worse, we gamble with the health of our children. Sometimes it is indifference that makes us do so; sometimes it is our fallacious idea of economy.

Perhaps if we could make personal preventive medicine as alluring a social function as was the Royal Touch for the king's evil, there would be less indifference towards it. But modern science has taken all the pomp and ceremony out of medicine. A medical examination today bears little resemblance to a presentation at court; the X-ray examination of the chest to detect tuberculosis is an unromantic substitute for a king who touches our sores and encircles our neck with gold. But if we can't have these glammers, we can at least have the satisfaction of being free from the diseases that accompanied them.

The old custom of touching for the king's evil was an attempt to cure tuberculosis. It was a useless treatment, because it was based upon superstition and not upon fact. In the light of modern knowledge the futility of the Royal Touch has become apparent, but nevertheless science has not replaced it with a cure for tuberculosis. It merely says that under careful and persistent treatment most people afflicted with tuberculosis get well; their disease is arrested and in time their health returns. But the extent and nature of the treatment depend entirely upon the degree to which the disease has progressed when detected. If the disease is well advanced, months

or even years of treatment in a sanatorium are required. If, on the other hand, the disease is detected in its earliest stages, it may be arrested with treatment that does not necessitate the interruption of school or regular employment. Aside from all other considerations, this difference is one of great financial importance.

CHAPTER TWENTY-TWO

RENÉ LAËNNEC



HAVE you read Rudyard Kipling's *Marlake Witches*? It is the story of a young French doctor captured by the English during the Napoleonic wars and billeted, as a prisoner, in an English household. This doctor is René Théophile Hyacinthe Laënnec who became one of the greatest physicians of all time.

The daughter of the family with whom he is quartered is sixteen; she has tuberculosis. A village character, a self-styled doctor, named Jerry, is her medical adviser. Among the people Jerry is known as the "witch wizard" because of his native ability to heal the sick with his herbs and charms.

Laënnec, the exponent of precise and exact scientific medicine, listens to Jerry as he advises the girl. And as I read his words, my sympathies and admiration go to Jerry, for although he lacks in scientific knowledge, he, nevertheless, has that human and kindly sympathy that makes his patients love him. It seems to me that modern health advice, however beneficent in its facts, sometimes lacks human sentiment. The bare facts that Jerry tells this girl are these: breathe deeply before your open window; keep fresh air in your rooms at all times. Stated in those words, there is a bareness, an impersonal quality to the admonition. After all, medicine is an art as well as a science; the greatest medical scholars are not always the best physicians, for sick people often care less for science than for sympathy and human understanding. Here is the way Jerry words his advice to the girl:

"You know the names of the Twelve Apostles, dearie? You say those names, one by one, before your open window, rain or storm, wet or shine, five times a day. But, mind you, 'twixt every

name you draw in your breath through your nose, right down to your pretty little toes, as long and as deep as you can, and let it out slowly through your pretty little mouth. There's virtue for your cough in those names spoken that way. And I'll give you something you can see, moreover. Here's a stick of maple which is the warmest tree in the woods. It's cut one inch long for every year. That's sixteen inches. You set it in your window so that it holds up the sash, and there you keep it, rain or shine, wet or fine, day and night. I've said words over it which will have virtue in your complaint."

Jerry and young Dr. Laënnec formed a close friendship. One day the girl, spying on them, saw them "playing with wooden toy trumpets. They were not real trumpets, because Jerry opened his shirt collar, and René put one end of his trumpet against Jerry's chest, and put his ear to the other. Then Jerry put his trumpet against René's chest and listened while René breathed and coughed. . . ."

Said Jerry. "'Tis wonderfully like hearing a man's soul whispering in his inwards; but unless I've a buzzin' in my ears, you make about the same kind o' noise as old Goffer Marklin—but not quite so loud as young Cooper. It sounds like the breakers in a reef—a long way off. Comprenny?" "Perfectly," answered René, and well he knew the meaning of that sound, for from it he had found the trouble in the young girl's chest.

Jerry knew that fresh air and rest were best for her sickness. That was his art. But he did not know where her sickness was nor what it was; he could not even recognize the sickness until the cough had come and until, as Kipling says of the girl, "her cheeks were pale except for two pretty pink patches in the middle, and she talked with little gasps at the end of her sentences, as though she had been running." But René, with "wooden toy trumpets," could hear the sound in her chest long before the other symptoms showed—that was his science. And Jerry heard in René's chest this same sound, "like the breakers in a reef—a long way off." And René, knowing the meaning of those sounds in his chest, said with tragic prophecy: "I drive on the breakers. But before I strike, I shall save hundreds, thousands, millions perhaps, by my little trumpets."

In his tale, Kipling goes on farther with the story of the stetho-

scope, for that is what Laënnec eventually called his trumpet. But before he coined that word he called it many things; a baton, a solometer, and a *cornet médicale*. His uncle Guillaume, a physican,



RENÉ THÉOPHILE HYACINTHE LAËNNEC

From a lithograph which he made of himself about 1820. Laënnec invented the stethoscope. He obtained his medical education in the closing years of the eighteenth century and under handicaps of severe poverty; he died at an early age of the disease for which he supplied a means of diagnosis—consumption.

suggested the name thoraciscope, but René was too much of a purist to accept a word that combined Latin and Greek, and so he dropped the Latin, *thoraci* and substituted the Greek root for chest, *stetho*—stethoscope, a chest-spy, or observer. The modern stetho-



LAËNNEC IN THE WARD OF THE NECKER HOSPITAL

From a painting in La Sorobone, reproduced in *Harper's Monthly*, May, 1899.
Laënnec is at the bedside, holding in his hand the wooden stethoscope that he used.
The Necker Hospital of Paris was founded in 1799 and named after Jacques Necker, then director-general of French finance.

scope has two earpieces instead of the single trumpet-shaped tube that Laënnec used.

Kipling says Jerry was a willing disciple in the use of the stethoscope; he was anxious to aid his art with the help that science could provide him. But objections came from the patients upon whom Jerry used it. "They've had it at me for some time back," said he, "because o' my tryin' your trumpets on their sick." Kipling, with a keen understanding of the problem of medical innovations, tells how the new measure met with opposition. The villagers said that Jerry was "impudently prying into God's secrets. . . ." The wooden trumpet he used was called the "devil's earpiece," and the superstitious people said it left "round, red, witch marks on their skins, and dried up their lights, and made 'em spit blood, and threw 'em into sweats."

It's amazing how beneficial innovations are objected to or ignored at first and then, as time goes on, are accepted as commonplace. Kipling's story centers round the beginning of the nineteenth century. Today, the stethoscope is an indispensable instrument of diagnosis of every physician in examining the chest. Yet it wasn't until well past 1850 that it came into general use. And the thermometer to take the patient's temperature—why, it is a household instrument today, yet it found its way widely into medical circles as late as 1870. The early ones were crude and clumsy; it required five minutes to take the temperature, and they were so large that one physician said it was necessary to carry them under the arm "as one might carry a gun."

In medical matters, there is often a long span of years between the invention of a means of improvement in diagnosis or treatment, and its general acceptance and utilization. Research in the laboratory and hospital is only part of the problem of medical advancement; there is a social side to it, also. The new methods, no matter how beneficial they may be, are useless unless they are accepted and brought into wide use. Education in this direction is as important as research.

Kipling's story, however fanciful in the telling, has much sound truth in it, but it does not tell us of René's life or how he discovered the stethoscope. He was born at 2 rue de Quai, Quimper, Brittany,

in 1781. Little is known of his mother; she died when he was six. His father was a lawyer who, in attempting to mix law and literature, succeeded in neither. René's uncle Guillaume was a prominent physician at Nantes. It was he who used his influence, during the turbulent years of the French Revolution, to keep René in school and to hold his interest always towards the study of medicine. Much of the uncle's influence was exercised, also, upon the boy's impractical father, to keep him from failing altogether in providing for his son.

René studied medicine at the hospital of Nantes, hoping always to go to Paris to finish his training. The father promised the needed money, but failed to provide it; in yearly disappointment, René repeated the single medical course at Nantes five times. Finally, in 1801, the long-delayed money, six hundred francs, was forthcoming, and René went to Paris, where his younger and more favored brother was already studying engineering.

Laënnec's academic progress was amazingly rapid, but he was handicapped always by his pitiful poverty. One can visualize this gaunt, short man, hardly more than a boy, pouring all the energy of his frail body into the study of medicine; and in his letters to his improvident father, begging him always to send money for books.

And then he discovered a way of earning some for himself; the government provided the schools with money to be offered as prizes in competitive examinations. René promptly won first prize in medicine and jubilantly entered his name for all that were open to him. Even here he was doomed to disappointment. When the other students found that they must compete with him, they withdrew from the hopeless task, and Laënnec was barred from the competitions. A small donation finally came from his father, to enable him to buy parchment upon which to write his thesis. Robbers broke into René's room and stole his shirts, his money, and half of his flute, an instrument to which he was passionately attached. Finally, in spite of all difficulties and embarrassments, the medical course was completed, the thesis defended and accepted; and René in 1805, took his first holiday since coming to Paris.

From the prolonged strain, his health was already breaking; there

were strong indications of the disease that was to end, prematurely, his brilliant career.

Even before he graduated he had started his studies on this very disease, tuberculosis. Following the lead of one of his fellow students, Gaspard Laurent Bayle, he made hundreds of autopsies, during many of which he found, in the bodies, diseased areas containing small lumps that he and Bayle called tubercles. After more than a thousand autopsies, these two were able to say that this tubercular condition could occur in any part of the body—the skin, the heart, the muscles, the intestines, the bones, and even the brain. But it was Laënnec, alone, who demonstrated that the disease then called phthisis, was tuberculosis of the lungs. It was Laënnec, also, who brought forward the idea, now so well substantiated, that the disease not only hampers the organ that it affects, but that there is produced a poison which affects the whole of the body and causes the symptoms of tuberculosis.

The basis of all modern knowledge of the disease tuberculosis, save one important fact, came from Laënnec's work. It was not until 1882, seventy-eight years later, that Dr. Koch demonstrated that the tubercles were caused by the action of bacteria and that the infectiousness of the disease was due to the spread of these tubercle-forming bacilli. It was Dr. Koch, also, who gave us the most precise test for the detection of the presence of infection, the so-called tuberculin test made on the skin. This valuable method serves to indicate among whom we should look for tuberculosis, but it does not show that the disease is active or even that it is in the lungs. The X-ray, aided by the stethoscope, is the diagnostic means by which tuberculosis in the lungs is detected in its early stages.

You can well imagine how anxious young Dr. Laënnec was to find some means of detecting, in his living patients, the pulmonary tuberculosis which he found so often at autopsy. What he wanted to do was to discover the disease early, while there was every chance of recovery under proper treatment.

He went into practice, and his patients grew in numbers; soon he was able to support his father. Then, in 1810 and 1816, two tragedies came into his life, both of which must have urged him on in his desire to find some way of detecting tuberculosis in its

early stages. First his brother and then his friend, Bayle, died of the disease. There was no X-ray or stethoscope by which to examine them, but within a year after Bayle's death, Laënnec had invented the stethoscope.

Of course, in those days, some physicians did listen, with their ear placed tightly against the chest, to the movement of the heart, and a few had commented on the wheezing sounds of breathing. Laënnec, like many others, objected to this method of examination; some patients were too modest; others were dirty and covered with lice. One day, while working in the Necker hospital, he attempted to examine in this way a girl with heart disease. But she was so fat that he could hear no sounds at all from her chest. Soon afterwards, in walking through the garden of the Louvre, Laënnec stopped to watch a group of children playing about a pile of lumber. Some of them put their ears against the end of a beam; the rest scratched and tapped on the opposite end. The sound traveled through the wood. Laënnec saw the answer to his problem. He set out for the hospital at a rapid pace. Reaching the room of his obese patient, he seized a paper-covered book, rolled it into a tight cylinder, and, to the amazement of the onlookers, put one end of this crude instrument against the patient's chest and applied his ear to the other. You can imagine his excitement when to his ear there came the heart sounds louder and clearer than he had ever heard them in anyone and, also plainly, those made by the air passing in and out of the lungs.

Soon Laënnec was making little wooden trumpets on a turning-lathe, and every day finding new and greater possibilities in his instrument of diagnosis, the stethoscope. There was around him ample material for his study of the abnormal sounds of breathing and other changes caused by tuberculosis, for, as he tells us, one-third of the patients admitted to the hospital were discovered, with the stethoscope, to have active tuberculosis.

In August, 1819, he published his monumental work, *Medical Auscultation, or Treatise on the Diagnosis of Maladies of the Lungs and Heart*. His work has, as Kipling said, "saved hundreds, thousands, perhaps millions, of lives."

Six years later Laënnec died of tuberculosis.

CHAPTER TWENTY-THREE

A CURE THAT TURNED OUT OTHERWISE



IN 1916 a young Frenchman, graduating from a medical school in Paris, selected as the topic of his doctor's thesis the harm done by the wide and misleading publicity given to the cure of disease. On first thought this seems a subject hardly deserving serious study and research. But in reality it is one of profound importance. The unwarranted and misleading announcements of medical discoveries exaggerated in publication lead to pitiful tragedies. Furthermore, the extreme interest in cures which gives them their news value shows by striking contrast one of the most brutal characteristics of human nature—general indifference to prevention.

Let me make my statements more specific by describing a definite situation. A girl eighteen years old is in a sanitarium under treatment for consumption. Of course, her disease should never have been allowed to develop. But her parents were indifferent to the means of prevention. This girl was not given the simple tuberculin test which would have shown long before her health broke down that she was infected. Failing that step, she did not have the yearly examination of her chest with X-rays which would have indicated the first progress of the infection toward a serious form of the disease. If detected in this very early stage, her disease could have been arrested with little inconvenience to her. Instead of being in a sanitarium with a long course of treatment ahead of her, she would be in school, at work, engaged in her social activities, and perhaps thinking soon of marrying and having a home of her own. She is now deprived of these things because her parents have allowed the natural indifference of human nature to stand in the way of their daughter's welfare. That, I maintain, is destructive brutality.

This girl, as I have said, is under treatment in a sanitarium. The X-ray pictures of her chest taken there at frequent intervals show that there is progressive betterment of her condition. Six months or a year from now she may be able to go home to her parents for

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POUR

LE DOCTORAT EN MÉDECINE

PAR

Georges BOURGÉAU

Né à Besançon le 2 juillet 1873

Les Erreurs et les Dangers

DE LA GRANDE PRESSE

EN MATIÈRE MÉDICALE

Président DESGREZ, *Professeur*

A. MALOINE & FILS - ÉDITEURS

27, RUE DE L'ÉCOLE-DE-MÉDECINE, 27

PARIS—1916

A SERIOUS CONSIDERATION OF ERRONEOUS PUBLICITY

Title page of Dr. Bourgeau's thesis dealing with the harm done by premature announcement of medical discoveries and by erroneous statements in the press concerning medical matters.

a time. They who ignored prevention have now developed a keen interest in her recovery. Their fears for her life have at last aroused a dormant sense of responsibility. That is the way with many parents; they are indifferent to the child while it appears healthy; they become solicitous only when disease sets in.

The parents of the girl in the sanitarium read in a periodical the

report that Dr. So-and-so had discovered a cure for tuberculosis. Immediately they went to the sanitarium, demanding information from the physicians. Theirs was the typical belligerency of shirkers who wish to put the blame elsewhere. "Why," they demanded, "isn't our daughter receiving the new cure?" They were told that no definite statement of a cure had appeared in a reputable scientific journal; that the report was probably premature and certainly exaggerated; that months or perhaps years must elapse before the true facts emerge. The parents, however, attributed these statements to over-conservatism and prejudice. Against the advice of the physicians, the girl was taken from the sanitarium. She was sent on a long journey to the headquarters of the new cure. There it was found, but too late, that the published report was misleading.

Sensing thousands of similar tragedies behind it, I recall a booklet published in 1890. It is loosely bound in pasteboard, and the typography of its sixty-one pages gives evidence of the haste with which it was rushed from the press. Its title in bold face type across the cover is, *The Greatest Medical Discovery of the Present Century, Professor Koch's Cure for Consumption Clearly Explained for the General Reader, with Life and Portrait of Professor Koch.*

Here are a few lines from the exuberant mixed metaphors of its preamble; it is the typical flamboyant publicity given to popular announcements of cures.

In breathless suspense the world, during the last few weeks, has been listening for the report that should give information of the progress of Dr. Koch's investigation concerning the curability of pulmonary phthisis. The shadows which every great event casts before it, appeared portentously in this case also; . . . drop by drop, and scantily at first, communications began to trickle into the press. The dim indications gradually took more definite forms, and were followed by official communications on the part of those physicians who were commissioned by Koch to test the new method of healing. . . . In view of the enormous interest which every individual naturally takes in this advance in the healing art, and advance entirely unforeseen . . . and in view of the universal outburst of astonishment of the medical faculty and layman alike concerning this marvelous fairy tale that, at the close of the year 1890, has become a distinct reality—it seems to me but right and proper that the non-medical public should receive full information of this cure.

After this introduction the author delves into the story of the discovery. If one reads carefully, he will find that while Professor Koch has announced that he believes he has discovered a cure for tuberculosis, he has done so with a restraint, emphasizing the importance of very early detection of the disease and admitting that his evidence is not final or absolutely conclusive.



A PORTRAIT OF DOCTOR ROBERT KOCH

But time is the real test of all cures; Dr. Koch was mistaken in his optimistic belief. He had found a substance which in selected cases in the hands of experts did sometimes apparently yield beneficial results when used as part of the treatment of tuberculosis, but that fact was far from the hopes that had been aroused by the world-wide announcement in 1890. What he had really discovered was not a cure, but a test, the most accurate and sensitive test there is for detecting the presence of tubercular infection.

You must not get the idea from what I have said of his error in announcing a cure for tuberculosis that Dr. Robert Koch was a mere enthusiast. On the contrary, he was the greatest bacteriologist that has ever lived and the founder of the modern science of bacteriology. He was one of the greatest of the many famous scientists that Germany has produced.

Dr. Koch started his medical career as an obscure general practitioner in a country town. In spite of his arduous duties he found time to devote himself to the study of bacteriology. When he commenced his work this subject was a branch of botany. Bacteria are very elementary and very minute plant forms. Dr. Koch's attention was attracted to them by the fact that Pasteur, the French chemist, had demonstrated that some of these microscopic plants could live and thrive in the bodies of men and animals, and that the presence and growth of certain of them were attended with disease.

Dr. Koch had no elaborate equipment such as one sees in a modern bacteriological laboratory. He had only a microscope and some kitchen utensils. But with these simple aids he developed the methods which are the basis of modern bacteriological technique. He separated and identified bacteria, he grew them in pure cultures, he stained and examined them, and he photographed them under his microscope. His first published work brought him at once into prominence, and soon afterwards he was given a place in the Imperial Health Department. Ten years later The Institute for Infectious Diseases was founded for him at Berlin, and he remained its director until a few years before his death.

In 1880 he demonstrated before the International Congress at London his method of growing bacteria on solid media such as plates of gelatine, one of the fundamental steps in the development of the science of bacteriology. On this occasion the French Pasteur is said to have rushed to his German colleague, exclaiming, "This is grand progress." And truly medical study knows no national boundaries; it is a universal science of humanity. Dr. Koch's work shows this fact, for it was to Egypt and India that he went to study Asiatic cholera. He found the bacteria responsible for the disease and developed a means of preventing the spread of the infection. Then at the request of the British government he journeyed to South

Africa to investigate cattle pests. He studied malaria, Texas fever, surra, and plague; 1902 found him in German East Africa investigating the tropical diseases there. In the same year he developed the means for controlling the spread of typhoid fever. In 1905 he was awarded the Nobel Prize. The following year, as the head of the African Sleeping Sickness Commission, he introduced a treatment for that malady.

His greatest accomplishment, however, was the discovery of the cause of tuberculosis. He demonstrated that the disease is due to infection by a rod-shaped bacillus and that the disease could develop only as the result of the multiplication of this particular organism in the body.

These microscopic plants, like seeds scattered on a field, are capable of growing on human flesh. Wherever they become implanted, a very minute lump is formed, and in the center of this are the bacilli. The lump is called a tubercle; hence the name tuberculosis. Fortunately the human body is a soil poorly adapted for the growth of the tubercle bacilli, and although their first entrance into the body may cause acute disease, usually their spread is arrested and they are held firmly in a few tubercles. There they may remain dormant for years.

Tuberculosis is acquired by contact with people who have the disease in active form. But in one respect it differs from other infectious maladies. If a child is exposed to an infectious disease such as measles, it develops the disease within two or three weeks, or else not at all. The acute illness that results usually gives complete immunity against a second attack. Tuberculosis, on the other hand, has no definite period for the development of the active disease; the infection may remain inactive for years. Moreover, the presence of this dormant infection does not prevent subsequent infections. It may render the subsequent infection less acute, but it makes it more likely to develop into the dangerous chronic consumption.

The wide prevalence of dormant tubercular infection has become evident as a result of the discovery which Dr. Koch thought was a cure for tuberculosis and the announcement of which created a world-wide sensation in 1890. He made a sort of broth and grew tubercle bacilli in it. Then he killed all of the bacteria. The mix-

ture was as innocuous as the juice from any thoroughly cooked vegetable—for remember that bacteria are simply microscopic plants. When a drop of this material is put into the skin of a man or animal who has never been infected with the tubercle bacilli, no effect is produced. But if the man or animal has been infected and



A CARICATURE OF DR. KOCH

Published in *Lustigen Blätter* at the time of a medical convention in Berlin. All of the prominent men present were caricatured in this same friendly manner. Koch is shown cultivating the bacteria and fungi.

the organisms are still present—even if they are dormant—the treated area of the skin becomes red and appears inflamed. The test is essentially the same as that now used to discover what pollen is causing hay fever, only in such cases the pollen of various plants is substituted for the tuberculin material.

The tuberculin test is used extensively on dairy cattle, as a means

of obtaining herds free from tuberculosis. The animals are tested at intervals. Those which give a positive reaction are killed before the disease has advanced to an active stage. Thus the possible sources of infection are removed. Obviously this drastic procedure cannot be followed in the case of human beings. And fortunately so for many of us, for when the tuberculin test is applied to apparently healthy people a considerable percentage are found to be infected.

Adults show a higher prevalence of infection than do children, and quite naturally so, because they have had a greater opportunity for exposure. Nevertheless, one of the most critical periods for tuberculosis is the teen age, from twelve to twenty. Practically all of the boys and girls who develop chronic consumption in these years of their lives have been infected previously in childhood; that is, they would have given a positive tuberculin reaction long before their disease became active.

That fact is a very fortunate one from the viewpoint of prevention. In various studies with the tuberculin tests made on large groups of school children the figures for positive reactions are variable, depending upon local conditions, but probably twenty per cent or a little higher may be taken as an average figure—one child in every five.

It is towards these twenty per cent that active preventive measures are to be directed. Chronic consumption does not give obvious indications of its presence in its early stages. A youth may appear in good health, maintain a normal weight, and even engage in athletics, but nevertheless have chronic consumption which incapacitates him only when it has become advanced to a degree where his very life is endangered. Consequently, for children who show a positive tuberculin test, the indispensable measure of prevention is frequent medical examinations. And the main feature of these is the inspection of the chest with X-rays.

Already a few—a very few—of our more progressive public schools are offering to the pupils the tuberculin test and following it with X-ray examinations for those children who give a positive reaction. The use of the tuberculin test and the X-ray is one of the most valuable health measures ever adopted in our educational system, and it is one which needs the active support of every citizen

who has at heart the welfare of our boys and girls. But until all of the schools have adopted this procedure, the duty must remain where it really belongs, upon the parents. They must have the family physician carry out the examination.

The prevention of chronic consumption is so definitely available today that any boy or girl who is made an invalid by the disease can justly accuse mother and father of neglecting their duties as parents, ignoring the welfare of their children.

CHAPTER TWENTY-FOUR

A FAMILY DISEASE



OME years ago a young man, ill with consumption, arrived at the village of Saranac Lake. A physician of New York City had sent him to the sanitarium in the Adirondacks founded by Dr. Edward Trudeau. He was asked, during his examination at the institution, whether his physician had prescribed anything for him.

"Yes," said the patient, and he produced a prescription which read:

R: Fresh air
Fresh eggs

Read Robert Louis Stevenson

The physician at Saranac wrote across the prescription, "Continue to take."

Robert Louis Stevenson, from his own suffering, distilled into his pages a philosophy of cheerfulness and simple happiness, almost a creed of mental conduct laid down for the many that suffer from the disease that he had.

From our childhood days we remember best *Treasure Island*. You have thrilled, I know, through every stirring page with Jim Hawkins, the Squire, Long John Silver, Black Dog, and Ben Gun. In his robust tale you have felt the indomitable spirit of its author, but nowhere for an instant have you sensed the frail hand that penned these stirring scenes. Can you see him? Robert Louis Stevenson propped up in bed on pillows, writing, writing, writing; sometimes hardly daring to turn for fear that a movement might start a hemorrhage from his diseased lungs.

He wandered the earth in search of health. Scotland, France, Switzerland, Italy—then a year at Saranac, under the care of Dr.

Trudeau, living in a cottage where today is the beautiful Stevenson Memorial Bronze; a year charmingly told of in the little story of the *Penny Piper of Saranac*. From there he made a trip across our continent; then took a boat for the South Sea Islands and so to a final resting-place in Samoa.

How sweetly and sincerely his spirit rose over bodily infirmity when in his island home he penned the lines of the prayer *At Morning*.

The day returns and brings us the petty round of irritating concerns and duties. Help us play the man, help us to perform these with laughter and kind faces, let cheerfulness abound with industry. Give us to go blithely on our business all this day, bring us to our retiring beds weary and content and undishonored, and grant us in the end the gift of sleep.

Robert Louis Stevenson, beloved to all of us, had tuberculosis. And the question, the very practical and unromantic question, that comes to my mind is: where did he acquire the disease that crushed his body but left his spirit unconquered? We shall never know now. But if we could have been with him when he was a boy to search for the source, our attention would have turned first to his mother and his father. Perhaps it would have stopped there, for tuberculosis is very frequently a family disease. Often it is handed on from parent to child. There are many, many instances where whole families have been almost annihilated by the disease, as was the Brontë family, made famous by the writings of the sisters Emily and Charlotte. Sometimes the adult source is an aunt, a grandmother, or a nursemaid.

In Robert Louis Stevenson's case we may, perhaps quite unjustly, suspect his mother. There are reasons to believe that she without ever knowing of it may have infected her son. As a boy Stevenson had a devoted nurse, a stanch Scotchwoman named Alison Cunningham. She has left a sketch of a tour on the Continent with the Stevenson family when Robert Louis was thirteen. It is called *Cummy's Diary*. In glancing through its pages you will find that it abounds in entries such as these: "I am thankful to say Mrs. Stevenson has stood the journey well—she is not coughing a great deal, which is a comfort." And again: "Mrs. Stevenson has been cough-

ing a great deal today. It grieves my heart to hear her. If it be the Lord's will, I do hope that the change may do her good."

Such meager statements as these may seem feeble evidence upon which to base a suspicion of consumption. You may think of the disease as one which gives rise to strikingly evident symptoms; fever, loss of weight, and extreme enfeeblement, as well as a persistent cough. Such is often the case in young people, for in them tuberculosis is frequently a disease which progresses rapidly and which, when far advanced, does show these definite symptoms. But consumption is also a very common disease of men and women past middle life, such as are in their late forties, their fifties, sixties or seventies.

Moreover, consumption in elderly people often appears very different from the same malady in young people. These elders are more resistant to the disease; it is milder and more chronic. Theirs is frequently an indolent disease progressing for years without showing any characteristic symptoms; there may be no fever, no loss of weight, and no prostration. There may be very little coughing, even though the disease is far advanced. Sometimes they may have symptoms of illness which appear to point to disturbance in their stomachs rather than in their lungs; they have indigestion. Even if they cough, they are inclined to attribute it to chronic bronchitis, repeated head colds, or asthma.

Men and women past middle life so afflicted with tuberculosis do not, as a rule, feel vigorous, but they may attribute this weakness to declining strength and failing health that they believe are the inevitable accompaniment of approaching age. They do not give in to their illness; they remain active. The danger of their disease is not so much to them as it is to others. They may live to an old age in spite of their chronic ailment, but from time to time the tubercle bacilli are present in the material that accompanies their coughing—a cough so mild as to be overlooked or else erroneously attributed to asthma or chronic head colds. The tubercle bacilli which they spread unwittingly are a constant menace to the health and life of all children and of all young people with whom they come in contact. These young people acquire from them an active and more serious form of tuberculosis.

Tuberculosis in the aged is very frequently undetected. Authority after authority in the field of medicine has called attention to the great frequency of unrecognized tuberculosis in men and women past middle life. It is these unrecognized cases of consumption in elderly people—mothers, fathers, aunts, and grandparents—that make consumption so often a family disease.

The term family disease does not imply inheritance of consumption, nor does it imply even an inherited predisposition or tendency to the disease. Tuberculosis is no more a hereditary disease than is smallpox. A baby from a tubercular mother is rarely infected at birth, but such a child is in great danger of acquiring the infection from the mother unless her disease is recognized and she takes the precautions necessary to prevent its spread. The erroneous idea that tuberculosis is hereditary arose from the fact that it spreads in the family—it spreads in the family because the source is there and because the contact between the members of the family is intimate and prolonged, thus giving the greatest opportunity for the spread of the tubercle bacilli.

I emphasize the word unrecognized, for it is from the unrecognized cases of consumption that the danger comes. When the disease is detected precautions can be taken to avert the possibility of spreading the disease. Men and women with recognized consumption can be instructed by a physician to care for themselves so that they do not spread the disease; they cease then to be a menace to others in the family. But the detection, the recognition, of the disease must come first. It is the first step toward prevention.

The extreme importance of the mild form of adult tuberculosis as a source of fatal infection in young people is especially emphasized in an excellent monograph recently published by Dr. Arthur Myers, chief of the medical staff of the Lymanhurst School for Tubercular Children at Minneapolis. Although his book deals primarily with tuberculosis among children—that is its title—he nevertheless devotes a considerable portion of it to the dangers of transmission of tuberculosis to children from unrecognized adult cases. His book is an authoritative work; it is intended for the physician, but I want to quote here a few sentences on the subject of tuberculosis in persons past middle age.

He says: "Tuberculosis in the aged is one of the greatest problems from the standpoint of the spread of the disease. Its danger lies in its mildness.

And further: "X-ray is one of the most valuable phases of the examination in such cases when the disease is chronic. In fact, many frank cases of tuberculosis in the aged will remain undiagnosed unless X-ray studies are made."

There are thousands upon thousands of homes in this country where tubercle bacilli are being scattered unwittingly from mild and unrecognized cases of consumption. These bacilli find a fertile soil in children. In the child, tubercular infection usually follows a different course from that in the adult, a more active course. But fortunately, this very activity calls into play an active reaction on the part of the body. In the majority of cases the infection is resisted and held in check; the tubercles that are formed are increased in scar-tissue, and lime is deposited in them. In less favorable cases the disease may be rapidly fatal, appearing as a general infection rather than as consumption, perhaps giving rise to tubercular meningitis. But even in those cases where the infection is arrested (they are the vast majority) the bacilli are not killed; their growth is stopped, but the bacilli persist. A child or adult with this type of arrested infection is not a source of danger to others; the disease is not active and hence the bacilli are not discharged in the secretions from the mouth and lungs. The bacilli in these foci may in after years break away from the forces inhibiting their growth; they then multiply and spread, causing active consumption.

The tuberculin test devised by Dr. Robert Koch shows the presence of both arrested and active infection. It does not differentiate between the two; it merely indicates the presence or absence of infection. Other measures, the medical examination with X-ray inspection of the chest, are necessary to determine the state of activity of existing infection.

The majority of children become infected at some time with tubercle bacilli, and the initial foci of infection are established, a fact shown by the high incident of positive reactions to the tuberculin test. Whether or not these children subsequently develop consumption depends upon two factors: the extent of their future

exposure to infection and their resistance to the tubercle bacilli. It is a well-established fact that the greater the frequency of infection the greater the probability that active consumption will develop, a point of considerable importance in relation to the control of the spread of infection from unrecognized cases of adult tuberculosis within the home.

Even without repeated infection the original foci of arrested infection may become active; the bacilli then spread through the lungs, destroying the tissue, forming cavities, and giving rise to active tuberculosis, the so-called chronic consumption. The reason usually given for the renewed activity of previously arrested infection is that the resistance of the body to the infection has become diminished. No one knows just what this resistance consists of, but it is generally assumed to be indicated by a state of good health and bodily vigor. Certainly the likelihood of a latent infection becoming an active one is greatly increased by any condition that diminishes general health and vigor. Poor nutrition, as in over-enthusiastic efforts to reduce weight and in the comparable but involuntary partial starvation of poverty, tends to diminish resistance to tuberculosis. So also do prolonged illness, pregnancy and childbirth, fatigue, and lack of sleep.

The presence of a latent focus of tubercular infection has of itself an influence upon resistance. It tends to increase resistance, but its assistance in this direction has some disadvantages. Childhood tuberculosis, the kind that follows soon after the first infection, may be very acute, a fulminating form of the disease. This type of tuberculosis does not occur among those who have survived the initial infection and carried for years the latent foci. The arrested but persistent infections which are of themselves without effect on health alter the reaction of the body towards tubercle bacilli. The growth of the bacilli is not entirely prevented, but is modified and made less active. Consequently, in the adult (in the case of tuberculosis this applies to anyone over fifteen years of age), active tuberculosis is not ordinarily an acute disease, but, because of the partial resistance developed from the earlier infection, a slow and chronic one.

Consumption of the adult form develops slowly; it rarely gives

striking indications of its presence until it is so far advanced that collapse of general health is imminent. It is for this reason that many cases of chronic consumption are overlooked. Nevertheless, in such cases the tubercle bacilli at times are present in the sputum. Infection is spread by these undetected and hence unprotected cases.

The tuberculin test followed, in case of positive reaction, by annual physical examination with X-ray inspection of the chest is now strongly advocated for all children. Some schools are already giving the students the advantage of this procedure. Many lives are saved, but the control of tuberculosis does not stop with the school child; it extends to the home. Where did each one of these children get its infection? If the child reacts positively to the tuberculin test, then the search should extend to the adults of the family. If each one gives a negative reaction, then there is no danger that the tuberculosis is a family disease. Even if the reactions are positive, it does not follow that there is active tuberculosis present—it means merely that infection has occurred at some time and that a medical examination with X-ray pictures of the chest is needed to show the progress of the infection.

The prevention of tuberculosis begins at home.

CHAPTER TWENTY-FIVE

THE IMPORTANCE OF DIAGNOSIS

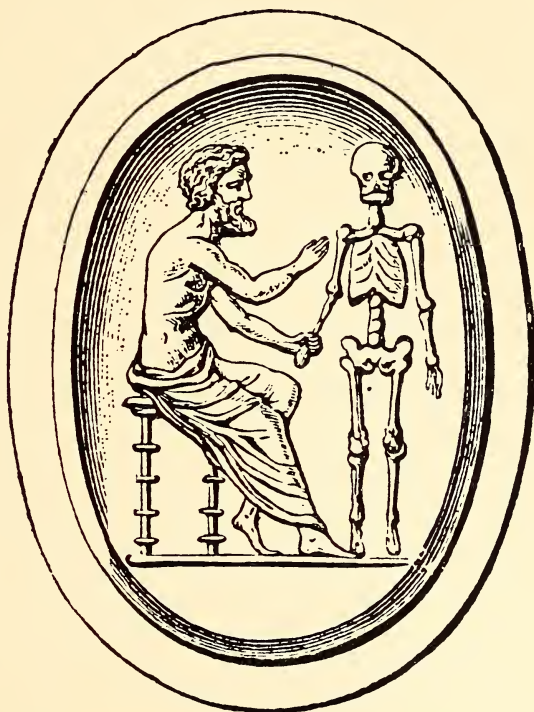


OME twenty-three hundred years ago the little nation of Greece was the intellectual center of the world. That country and that period have bequeathed to us a galaxy of immortals. Among them are Pericles, the statesman; Herodotus, the historian; Aristophanes, Euripides, and Pindar, the poets; Philias, the sculptor; Polygnotus, the painter; Plato and Socrates, the philosophers; Aristotle, the scientist; and Hippocrates, the physician. These men of long ago helped to shape our present civilization; they laid the very foundations of democracy, art, science, literature, and medicine. If we have improved these things, it has been merely in detail, not in principle.

The influence of these great characters of antiquity is felt after all the years between. So exalted are these men that they seem like giants in the world; greater and stronger than other mortals, for legend and tradition make them appear that way. But if we had known them in their day, I imagine that we should have found them all much like the ordinary human beings that we meet every day—leading the same humdrum lives and confronted by the same petty annoyances. I like to think of them as being that way.

I have in my mind two pictures of Socrates; one that makes him very human and the other almost superhuman. I see him first solemnly stumbling through the steps of the classic Grecian dance, whiskers blown one way and robe the other; for we are told that Socrates, while not appreciating dancing as an esthetic art, nevertheless indulged in it as a form of exercise. The other picture, the one that gives the superhuman aspect, is in his death scene. He had been accused of corrupting the ethics of young men; he was found

guilty and condemned to drink the poisonous hemlock. He drank the potion and soon fell into a stupor, but near the end he roused long enough to say: "We owe a cock to Æsculapius." Æsculapius was the Grecian god of medicine. Through all times Socrates will



PROMETHEUS MODELING A MAN

The fabled Prometheus was the friend and benefactor of mankind; he defended men against the anger of Zeus and stole fire for them, concealed in a hollow fennel stock. Among his exploits he was believed to have created a man out of clay. In the design shown here, taken from an antique Sard intaglio, Prometheus has completed the modeling of the skeleton.

be recalled as the man who, even at the end, remembered his doctor's bill.

I like to imagine, without any basis for my fancies, and only for the satisfaction it gives me, a scene at evening in an Athenian garden—the olive trees casting dense shadows in the twilight, the hush of impending nightfall, and Plato there at rest, discussing between

yawns—not philosophy, but the rising prices in the market, and his rheumatism. Men haven't changed very much in twenty-three hundred years.

So long as I have started in this vein I might as well continue and relate a bit of gossip. It is now a little old, but my excuse for retelling it is that it shows that things in Athens in the great days of antiquity were much as they might be in our own times. It is that scandal about Pericles and Aspasia. She was a lady physician, and by the way she was not the only one of her sex that took kindly to medicine in bygone days, for we are told that Cleopatra was also a physician and wrote on medical subjects. I have never seen any of her writings. She is credited with certain well-known pharmacological experiments with snake venom, but I have always doubted that story, for the Egyptian asp is said to be nearly four feet in length and doesn't correspond at all with the asp that is generally pictured with Egypt's queen. Now I don't know whether their medical acumen added to the attraction of these two ladies or whether it merely influenced their morals, but at any rate when Aspasia migrated from Miletus into Athens, she started a house of ill-repute. Socrates offered her sound philosophical advice for running her establishment, and Pericles fell in love with her. He divorced his wife. Next he was accused of allowing Aspasia to govern Athens through her influence over him. Popular feeling rose high against her. The power of Pericles declined. Aspasia was charged with impiety, and tried. The broken Pericles appeared as her advocate, but in court his eloquence failed him; he could only clasp Aspasia in his arms and weep. She was acquitted. She deserted Pericles. She married a wealthy grain merchant. No—things haven't changed fundamentally in twenty-three hundred years.

Now, as I said, there was a great physician who was a contemporary of Pericles. His name was Hippocrates. His greatness and his title, "the father of medicine," rest upon these facts: he separated medicine from religion and philosophy and made it an independent subject. Prior to his time the healing art had been a part of the duties of the priests, and both health and disease were attributed to the activities of the gods and consequently considered beyond the control of men. Hippocrates removed this responsibility for human

welfare from the gods and placed it upon the shoulders of man. Furthermore, he laid down a code of ethics which to this day governs the actions of the physician. Greatest of all, he brought into the field of medicine the idea of accurate observation and honest deduction. He said: "To know is one thing; but merely to believe one knows is another. To know is science, but merely to believe one knows is ignorance." Another of his aphorisms has become a part of the literature of all lands: It is opposed to dogma and mere opinion, and says: "Life is short, art is long, the occasion fleeting, experience fallacious, and judgment difficult." And he found judgment difficult, for he attempted and accomplished for the first time the difficult task of diagnosing diseases. He sat beside his patients and studied the symptoms of their maladies, and from these he attempted to determine the nature of the disturbances within their bodies. He founded medical diagnosis.

He had no instruments to aid him in this; he had only his open mind, his keen senses, and his bare hands. Nevertheless, from observation alone he was able to define diseases. That is, he was able to show that when a certain association of symptoms occurred, the disease followed one course; whereas, when another association of symptoms occurred, the disease followed another course. He was thus able to differentiate one disease from another, such as malaria from consumption. He was able, after much experience gained from observation, to predict from the symptoms the course the disease would follow and to prescribe the known form of treatment that afforded the greatest likelihood of recovery. He recorded his observations for the use of future physicians, his failures as frankly as his successes.

Let us in our imagination visit a patient with Hippocrates. Before us is a young girl, the daughter of an Athenian citizen. She is delicate and willowy; her face is of appealing beauty—soft moist eyes, pale cheeks charged ever and again with a flush of red. She might well be the inspiration of Polygnotus, the painter, or Pindar, the lyric poet; but the gray-bearded physician seeks not for beauty, but for disease. He sees her weak and tired, her frail frame shaken by a racking cough. He turns from these obvious symptoms and seeks for other and more elusive ones. He gradually constructs

the picture of the disease; finally, in his mind, it exists as a recognized entity. Then only, when he has made his diagnosis, is he prepared to offer an opinion as to the course of treatment and probable outcome of her malady.

This girl, says Hippocrates, is in no danger of dying immediately, but will die before many months unless she goes beyond the city, rests in the sunshine—rests, and eats, and drinks much milk, until



CHARON RECEIVING THE DEAD FROM MERCURY

From an antique engraved gem. Mercury—or Hermes—the messenger of the gods, is delivering a spirit to Charon, who will ferry it across the Styx. The emblem of Mercury is a pair of wings with two intertwined snakes on a rod. This design, without the wings, is often used in medical insignia as the staff of Æsculapius, the god of healing. The Æsculapian staff had on it only one snake.

the flesh rounds her now frail frame, until the cough is gone and strength has returned. He points to her chest and says the trouble is in there, but how much or little trouble he does not know, for he can only judge by symptoms that appear to his eye or hand. The physician of today calls this disease tuberculosis and recommends essentially the same treatment prescribed by Hippocrates twenty-three hundred years ago.

The great contribution of Hippocrates was medical diagnosis. Without accurate diagnosis all treatment and all opinion become

mere guesswork. Diagnosis is the most difficult branch of medicine, and it is also the most important. Yet patients rarely appreciate its importance. I imagine that even those of Hippocrates became restless and irritable while he sat beside them, slowly seeking with the few means at his command to make the necessary diagnosis. Patients then, no doubt, as today, wanted first of all pills and elixirs and treatments to hasten their recovery, and an immediate opinion on the outcome of their illnesses. There must have been some among them who became discouraged and turned to quacks—for there were quacks then as today—who based their diagnosis on showy guesses or made none at all and gave treatment—useless treatment—with all the confidence of ignorance. Correct diagnosis must precede any scientific attempt at healing.

For some few diseases there are specific cures, means by which the disease can be overcome with almost absolute assurance of success. But even these methods of treatment can be used only when the disease is recognized—that is, diagnosed. Moreover, for those numerous diseases for which there is no specific remedy the diagnosis itself is often tantamount to treatment. If diseases are detected early they usually can be arrested.

Cancer is generally curable in its early stages by surgical operation, but the diagnosis must be made first. In a large percentage of all cases of cancer, life or death depends upon early diagnosis; hence the public are continually urged to consult their physicians for diagnosis in case of any persistent swelling, or sore, or bleeding, rather than wait until the condition is well advanced.

One of the greatest arguments in favor of the periodic physical examination is the early detection of the rising blood pressure which almost inevitably precedes by months or years the hardening of the arteries. Hardening of the arteries cannot be remedied, but the heightened arterial pressure which precedes it can easily be detected by examination and can often be relieved. Untimely hardening of the arteries is thus prevented.

Since there is no specific remedy for tuberculosis, successful treatment depends upon early diagnosis. The treatment today is essentially the same as the one prescribed by Hippocrates. Nevertheless, there is a much greater assurance of recovery from this disease now

than there was in the days of Hippocrates. The difference is due almost entirely to improvement in diagnosis. The earlier the disease is detected the greater are the chances of recovery.

The difficulty of diagnosis in tuberculosis in the past came from the lack of any precise method with which to determine directly what changes were occurring in the lungs. Hippocrates could judge only indirectly from the outward appearance of the patient, the fever, the cough, and the loss of weight; he made deductions from the signs he observed. The disease was well advanced before these signs became evident.

Today, however, the actual changes in the lungs in this disease can be accurately determined. The modern methods of diagnosis which have made this possible resulted from the work of three men: Leopold Auenbrugger, René Laënnec, and Wilhelm Roentgen.

Auenbrugger lived in Vienna in the time of Empress Maria Theresa. His great contribution to medicine was the introduction of percussion as a means of diagnosing disease in the chest. Everyone who has had a physical examination is familiar with this procedure. The physician strikes gently on the chest with the tips of his fingers; a sound is elicited. Under the gentle stroke the chest gives out a reverberation like that of a muffled drum. That is to say, the normal chest yields that kind of sound. But over diseased areas percussion elicits a different note. The nature of this altered sound, evident only to the trained ear, indicates the presence of solidification or cavities in the underlying lung. In crude principle the method of percussion is the same as that used by a carpenter who taps along the wall of a room to locate by the changing sound the position of beams and studdings behind the plaster.

Percussion is an extremely valuable method of diagnosis. It is also a difficult one, requiring training and much experience for successful application. It was the first means available by which the physician could make any direct estimation of the advancement or regression of tuberculosis of the lungs. Auenbrugger brought forward this method in the middle of the eighteenth century, but unfortunately its value was not at first appreciated. His work remained unnoticed until 1808, a year before his death, and only eleven years before Laënnec invented the stethoscope.

This instrument is the familiar ear-trumpet of the physician. In its present form it usually consists of a small hollow cone or funnel of rubber or metal, to which are attached two rubber tubes that fit

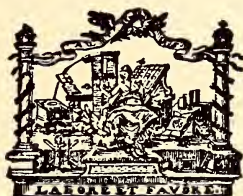
LEOPOLDI AUENBRUGGER

MEDICINÆ DOCTORIS
IN CÆSAREO REGIO NOSOCOMIO NATIONUM
HISPANICO MEDICI ORDINARIÛ.

INVENTUM NOVUM

EX
PERCUSSIONE THORACIS HUMANI
UT SIGNO

ABSTRUSOS INTERNI
PECTORIS MORBOS
DETEGENDI



VINDOBONÆ,

TYPI: JOANNIS THOMÆ TRATTNER, CÆS. REG.
MAJEST. AULÆ TYPOGRAPHI.

MDCCLXI.

TITLE PAGE OF LEOPOLD AUENBRUGGER'S BOOK ON PERCUSSION

Auenbrugger discovered the method of diagnosis based on interpreting the sounds elicited when the chest is tapped with the fingers—percussion. Auenbrugger was a Syrian by birth; in 1751 he became physician-in-chief to the Hospital of the Holy Trinity at Vienna. His great discovery was tested out there and his diagnoses confirmed by post-mortem examinations. His work received scanty attention until 1808, a year before his death, when Covisart popularized it.

tightly into the ears of the physician. With the tubes thus in place the physician holds the funnel against the patient's chest. The sounds made by air passing in and out of the lungs, and those made

by the heart in pumping blood, can thus be heard in magnified intensity. To the trained ear the nature of these sounds affords a most valuable means of diagnosis of diseases of the heart and lungs.

The art of auscultation, that is, listening to the sounds within the body, was not altogether new with Laënnec. His particular contributions were the development of the method and the invention of the instrument, the stethoscope, which allowed such sounds to be heard more precisely and thus estimated more exactly.

The next and greatest advance in methods of diagnosing tuberculosis of the chest came as the result of the discovery of X-rays or, more correctly, Roentgen rays, in 1895. Wilhelm Roentgen, professor of physics at Strassburg, demonstrated this peculiar kind of energy while experimenting with electrical discharges passed through vacuum tubes.

X-rays, like radio waves, are invisible. They both have the property of passing through solid materials, but X-rays, unlike radio waves, are capable of affecting photographic plates and films.

X-rays, as I have said, pass through solid materials, but not with the same degree of energy, for the ease with which the rays penetrate a material depends upon its density. Thus when the hand is placed upon a light-tight holder containing a photographic film, and exposed to the rays for a fraction of a second, a shadow is cast by the hand. When the film is developed, an image of the hand is seen—not as a mere shadow, such as results when the hand is placed in a beam of light, but a shadow image of the dense bone, showing all of its intricate structure, surrounded by a darker shadow image of the less dense flesh.

When this method is applied to examination of the chest, the shadows cast by the diseased portions of the lungs appear different from those cast by the healthy parts. In this manner it is possible to obtain a record—a permanent record—showing the presence or absence of disease.

X-rays afford no treatment of tuberculosis. But they do afford the best, the most positive means of diagnosis in the early stages of the disease. As that alone, they have already, in the few years that they have been available, saved many thousands of lives.

CHAPTER TWENTY-SIX

WILHELM KONRAD ROENTGEN



TALES of exploration, the valiant search into the unknown, hold a fascination for most of us. Our imagination is excited by the deeds of the great explorers who have turned away from the prosaic affairs of life and have beaten pathways into new lands and gone among strange peoples. But it is not the discoveries that these men make that call forth our admiration. It is their adventures—their struggles in which strength and ingenuity are pitted against failure and death. Few people are stirred deeply by the added splotch of color on the map which marks the tangible and permanent result of the exploration. The adventure of the explorer is the spice which warms the blood and endears to us such men as Magellan, Balboa, Vasco da Gama, and Columbus.

There is another class of explorers whose exploits are rarely heralded by the waving of flags, to whom few monuments are erected, and whose names find small place in world history. They are the explorers of science. They change no maps, but they change our ways of living. Their successes have been of inestimable value to the prosperity, comfort, and health of mankind. The handicaps that they encounter and the difficulties they surmount are greater than any that confront the adventurers who chart the unknown waters of the world. But exploration into science often fails to catch and hold the popular attention, because about it there is no dash and roar, no blood and thunder. We are inclined to measure success by the extent of its spectacular aspects. Nevertheless, when evaluated on the basis of true benefit to human welfare, the greatest credit falls to the quiet explorers in the realm of science.

I am going to tell something from the life of one of the most

successful of these men, Wilhelm Konrad Roentgen, the discoverer of X-rays, or Roentgen rays, but before I do so I want to make clear the handicaps that confront the men who explore in science. Imagine the difficulty confronting an explorer called upon to chart a mysterious land which he cannot see nor hear nor feel, to give an accurate description of his discovery, and to turn it to a use of great value to all men. Does not an explorer who overcomes such seemingly insurmountable handicaps as these deserve the highest admiration?

I do not exaggerate the handicaps of scientific exploration; literally these were the conditions that confronted Roentgen. You see, there are a great many things in the universe of whose presence we are still entirely ignorant. The world, to the human being, is an artificial one that he creates in his own mind from the very limited impressions gained by his senses. There are sounds that are too shrill to have impressed his ear, there is light that has not been seen, and forces that have not been felt. Since he has gained no perception of these things they do not appear to him to exist. But nevertheless they do exist; some of them have been discovered and described, while others yet wait for revelation by further explorers with a breadth of mental vision beyond that of ordinary men. It does not require ships and soldiers, airplanes and submarines, to explore in the unknown of the universe; what is needed is the rare ability to grasp and comprehend the furtive hints that nature occasionally offers.

I should like to reconstruct for you, as nearly as I can from the rather meager facts available, an exploration that took place on November 8, 1895. The events occurred in a darkened room in the Department of Physics of the university located at Würzburg, Germany, a quiet old-world town on the river Main.

The equipment for the exploration is a large but crude induction-coil supplied with current by a battery of wet cells and capable of making noisy sparks between the two rods at its terminals. Wires from the coil extend to a pear-shaped glass bulb from which the air has been removed. In the vacuum a stream of electricity passes between the terminals to which the coil is attached. A yellowish-green light is generated in the bulb, streaking the glass with

flickering bands of color. This type of bulb, commonly called a Crookes tube, has already been used by many investigators who have studied the light that emanates from it. If a piece of paper coated with certain metallic salts, such as barium platino-cyanide, is held before the light, the coating on the paper glows with a curious, glimmering fluorescence.



A CARICATURE OF DR. ROENTGEN

Published in *Lustigen Blättern* at the time of a medical convention in Berlin; all the notable physicians and surgeons present were caricatured in a friendly fashion.

In the room is a man of fifty—the physicist, Wilhelm Konrad Roentgen. For a time he watches the light from the tube; then he starts his explorations. Momentarily he interrupts the electrical discharge while he folds a sheet of black cardboard about the tube to prevent the escape of light. When the bulb is fully covered, he again starts the flow of current. He looks toward the place where the tube is situated, but no light leaks out; there is nothing visible to his eye in that direction; but at the same time he is conscious of a glow of light somewhere in the room. He turns to the table where

he has placed the paper coated with barium platino-cyanide. It glows; its surface shines with a mysterious, ghostly light. It shines as brightly as it did before he covered the vacuum-tube with cardboard.

He takes the glowing paper in his hand and turns its coated surface away from the tube—it continues to glow! An invisible ray is passing through the cardboard and through the paper, lighting up the metallic salts. The now excited explorer has found the unknown that he sought. Quickly he holds a heavy piece of metal between the tube and the paper; the metal casts a dark shadow; a book held there casts a barely appreciable one. The explorer holds his hand before the paper; again a shadow appears, but such a shadow as no one has ever seen before—the shadow thrown by the bones of the hand. The invisible rays have passed through his flesh as they have through the cardboard, the book, and the paper.

The discovery is made. But the unknown ray is not yet studied and defined. Days and nights of feverish activity follow, long hours of experimentation, from which comes another discovery. These new rays, although invisible to the eye, affect photographic films and plates and so can be recorded. That fact explains a mystery.

Crookes and others, who had experimented with vacuum-tubes, had often found the photographic plates kept in their laboratories fogged and useless. But instead of attempting to find out what ruined these plates, they merely returned them to the manufacturer as defective. If they had suspected that the use of the vacuum-tubes caused this fogging of the plates they probably would have discovered the X-rays before Roentgen did. But as it was, they ignored the hint thus offered to them. The discovery fell to Roentgen, who had the breadth of vision to see where other men were blind.

Late in December of 1895 Roentgen prepared to make his discovery known by writing, as is the way of scientists, a clear, cold description of his work. Let me read you a few lines from one of the most valuable documents in the whole range of scientific exploration. It is entitled "On a New Kind of Ray," by W. Roentgen.¹ It commences thus:

¹ Sitzungsberichte der Würzburger Physikalischen-Medicinischen Gesellschaft, 1895.

If the discharge of a fairly large induction-coil be made to pass through a Hittorf vacuum-tube, or through a Lenard tube, a Crookes tube, or other similar apparatus, which has been sufficiently exhausted, the tube being covered with thin black cardboard which fits it with tolerable closeness; and if the whole apparatus be placed in a completely darkened room, there is observed at each discharge a bright illumination of a paper screen covered with barium platino-cyanide—the fluorescence thus produced being entirely independent of whether the coated or plain surface is turned toward the discharge tube.

Further in the paper he says:

If the hand be held between the discharge tube and the screen, the darker shadow of the bones is seen within the slightly dark shadow-image of the hand itself.

Still further:

I have observed, and in fact photographed, many shadow pictures of this kind, the production of which has a particular charm. I possess, for instance, photographs of the shadow of the profile of a door which separates the room in which, on one side, the discharge apparatus was placed, and on the other, the photographic plate; the shadow of the bones of the hand; the shadow of a wire wrapped on a wooden spool; of a set of weights inclosed in a box; of a piece of metal whose lack of homogeneity becomes noticeable by means of the X-rays, etc.

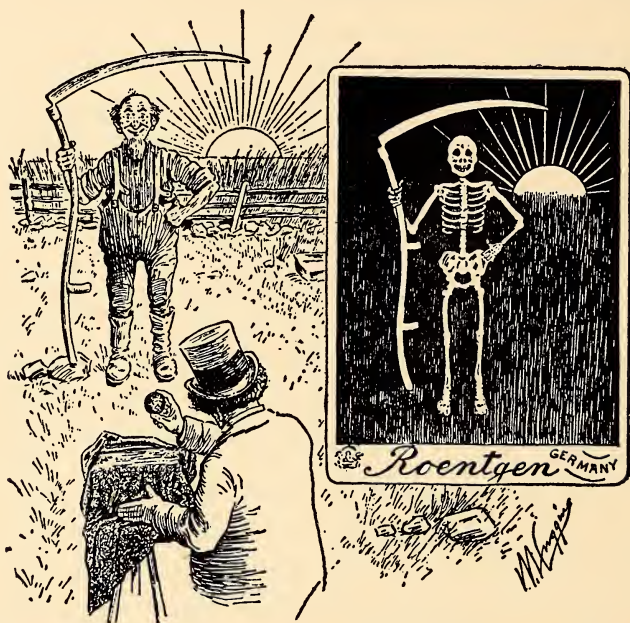
Roentgen in his paper calls the force that he has discovered, the X-ray; in a footnote he says:

For brevity's sake I shall use the expression "rays"; and to distinguish them from others of this name I shall call them "X-rays."

When Professor Roentgen read his paper before the Würzburg Scientific Society at its meeting late in January of 1896, it was decided by unanimous vote that in his honor the rays should be called Roentgen rays. But shortly before that meeting the secret of his discovery had leaked out. On January 6, a newspaper in Vienna published an account of it; the article was copied in the papers of the continent, and on January 9 was cabled from London throughout the world. The name X-ray thus became widely circulated and has remained in popular use.

As I said, the news of Roentgen's discovery was sent to the newspapers throughout the world. But the badly garbled accounts that

they printed led to much misunderstanding of its true nature. Readers gathered the idea that the new rays could be used anywhere and at any time. Consequently, certain timorous ladies were greatly shocked at thoughts of the possibilities thus presented; an enterprising English merchant promptly advertised the sale of X-ray proof underclothing. Within a month after the announcement of



THE NEW ROENTGEN PHOTOGRAPHY, "LOOK PLEASANT, PLEASE"

An early cartoon of Roentgen's discovery of a "New Photography"—X-rays—published in *Life*.

the discovery, a bill was introduced at the state legislature of New Jersey prohibiting the use of X-rays in opera-glasses at theaters; but whether this proposal originated in the modesty of the actresses or was designed to preserve the morals of the spectators, I do not know.

The members of the medical profession, however, were quick to realize the inestimable boon that the new discovery offered for their work. Coils and tubes, quickly assembled, soon cast their flickering lights in nearly every city and hospital.

In these early days the technical aspects of radiology were crude; the feeble rays generated by makeshift apparatus necessitated prolonged exposures. In one medical journal of 1897 I notice a statement that the exposures of an hour or more are trying to the patients, and the body heat tends to melt the gelatin off of the photographic film. Now, however, these technical difficulties have been overcome. Efficient tubes have been developed along new principles of construction, and powerful transformers have been built to supply them with electricity at the necessary high voltages. Screens have been invented to intensify on the film the action of the rays, and new types of films have been devised for this purpose that give, even with very short exposure, especially clear and detailed reproductions, which facilitate interpretation. With modern equipment radiography of any part of the body, even the skull, is accomplished in a fraction of a second with precision and certainty of result.

The specialty of radiology, however, goes far beyond the mere technique of making X-ray exposures. The accurate interpretation of these records requires consummate skill, wide experience, and a precise and detailed knowledge of the structure of the body, perhaps greater than that needed in any other branch of medicine.

In the thirty-five years that radiology has had a place in medicine it has attained an ever growing importance. It was used at first only to locate, in the flesh, foreign bodies, such as bullets and needles, and to detect fractures in bones. Now it has extended to every branch of medicine. In dentistry it is used to detect abscesses of the teeth and infection in the jawbone; more recently it has come into use as a part of the routine examination in locating cavities which develop on the interproximal surfaces of the teeth—the surfaces in contact with adjoining teeth—that would otherwise be overlooked and thus lead to serious decay; one of the greatest modern advancements in dental practices. Radiology is the inseparable ally of surgery; it shows fractured bones and foreign bodies in the flesh, the abnormalities of the digestive and urinary systems, and the location of tumors and cancers. In obstetrics it has its place in the routine examination of expectant mothers to show the size of the pelvis and thus to obviate certain dangers of childbirth. In internal

medicine radiology has brought precise and early diagnosis for rickets, pneumonia, and tuberculosis.

Nor is medicine the only field in which Roentgen's discovery has been turned to practical use; but its wide and valuable place in industry and research are chapters that I cannot deal with here. But before I turn from this subject one more word of the man himself—to whom we are all indebted. His discovery was honored; he received public recognition and awards of medals and prizes, including the Nobel Prize. But he was a man of sensitive nature, and the blatant and spectacular publicity given to his work caused him to shrink from any public appearance. The World War saddened him and ruined him financially. In 1919 his wife died, and he was left an unhappy and lonely old man. A malicious and wholly unfounded report was circulated that his assistant, and not he, made the great discovery, and this libel added to his sadness. He died in February, 1923, a tired and weary explorer.

CHAPTER TWENTY-SEVEN

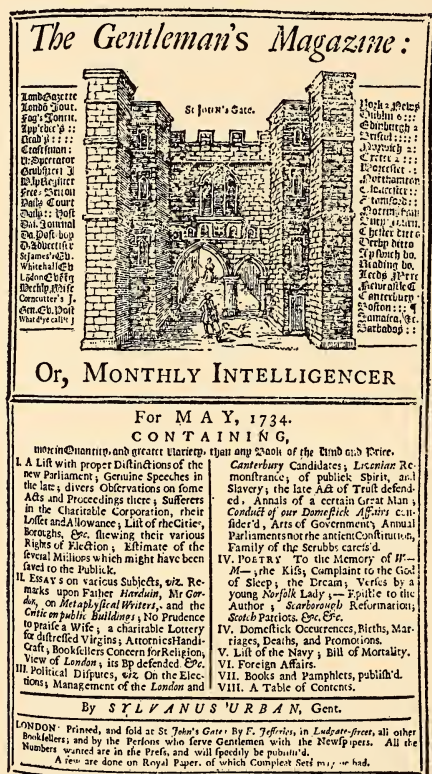
DR. PERCIVAL POTT



IN A cold January day in 1756 there was an accident on Kent Street, Southwark, a suburb of London. Dr. Percival Pott, the fashionable London surgeon, returning from visiting a patient, was thrown from his horse to the rough cobblestone pavement. His foot struck against one of the round stones, his ankle turned sharply side-wise, and in consequence the joint was dislocated and the smaller of the two bones of his leg was broken across, some three inches above the ankle. Moreover, the fracture was compounded, that is, the end of the bone was forced through the flesh and skin. It was a serious injury, particularly in those days before antiseptic surgery.

A crowd of people quickly gathered about the injured man lying on the pavement. House doors opened; gentlemen in knee breeches and periwigs put down their port and *The Gentleman's Magazine*, and flanked by butlers and footmen, pushed their way through the ring of street gamins and small merchants; alternately, they offered advice to the prostrate man and bowed pompously to neighbors. On the outskirts of the crowd the maids and footmen, having satisfied momentarily their morbid curiosity, took advantage of this legitimate interruption to their duties and fell to gossiping and flirting. A pickpocket and his accomplice stole softly through the crowd. A blackened chimney-sweep darted out of a shop, a bolt of cloth under his arm. For a moment, attention turned from the injured man to this minor attraction as the shopkeeper left the circle of spectators and dashed down the street after the diminutive thief; it was an unequal race and the sweep cast the bolt away; the mer-

chant, like Atalanta in the fabled race with Hippomenes, stooped to pick up the cloth; the sweep disappeared around a corner. The merchant returned, brushing the dirt off of his goods. He entered his shop. Attention again centered on the man with the broken leg.



A PAGE FROM THE "GENTLEMAN'S MAGAZINE" OF 1734

This periodical was started in 1731; its short but accurate obituary notices afford now a rich source for genealogists.

Volunteers offered to carry him into one of the shops; a gentleman vociferously shouted for his footman to fetch the carriage and take the gentleman wherever he might wish; another courteously offered the hospitality of his home. But Dr. Pott knew too well, in case of injury such as his, the grave consequence of rough handling and the awkward position required by a carriage. He preferred to

lie on the cold stones without moving until proper provisions could be made to transfer him to his home.

Scenes such as this are, with changed surroundings, common to-day. You have seen accidents on the streets of our cities and watched the crowd gather. But there is one striking difference. The blue-coated figure of the policeman appears on the scene; calmly and authoritatively he controls the situation. A telephone call goes through to the nearest hospital; a moment later the screech of the siren is heard, and through a traffic respectfully at a standstill the ambulance draws up; the injured man is lifted carefully and borne away to immediate medical aid. But this efficient provision for the injured is a very modern development. The first hospital ambulance service in the world was established in 1869, at Bellevue Hospital, New York City—more than a hundred years after Dr. Pott fell from his horse in the street of Southwark.

In his day, neither were there hospital ambulances nor was there yet an adequate police service. In 1756, the reign of absolutely uncontrolled street hoodlums was barely drawing to a close under the influence of the police changes instigated by the great novelist, Fielding. Gangs of young men who assumed the name of "Mohawks" still committed the most shocking and wanton atrocities on the passers-by in the open streets. Gangs called "sweaters" gathered around inoffensive citizens, pricking them with swords to make them dance; the favorite amusement of the "tumblers" was to stand women on their heads or roll them down hills in barrels; others practiced "tipping the lion," squeezing the nose of the victim flat against his face and poking fingers in his eyes. While these outrages went on, the poor, decrepit men of the watch stayed well out of the way, lest they be beaten and killed to provide further sport for the drunken rakes and robbers who swarmed the streets. Horace Walpole, in speaking of London in 1751, said, "One is forced to travel even at noon as if one were going to battle." A body of armed retainers was necessary to insure safety when going to the theater of an evening.

When civic matters were in such a state, it is not to be wondered that for two hours, on that cold winter's day, Dr. Pott lay on the

pavement while provisions were being completed for carrying him to his home.

He directed the steps of his own rescue. A man was sent to Westminster to fetch two chairmen with poles. Next, he purchased a door,



STREET ROBBERS

After a drawing by Rowlandson. In England, until the beginning of the nineteenth century, robbery and violence were rampant everywhere; highwaymen infested the roads, footpads lurked in the streets; often both watchmen and innkeepers were accessories to their crimes. When, in 1829, Sir Robert Peel laid the foundation of the existing metropolitan police system it was computed that nearly five per cent of the population lived by crime.

and when the chairmen arrived he directed them to nail their poles to it. When this hard, flat stretcher was completed, he had the men lift him very gently, taking especial care not to bend his injured leg,

and place him on the door. The chairmen then lifted the poles across their shoulders, and the strange procession made its way slowly through Southwark, over London Bridge, and into Watling Street, and so to Dr. Pott's house near St. Paul's Cathedral.

A group of surgeons gathered around the bed of their injured confrère. Dr. Pott, a greater surgeon than any of them, submitted to their opinion, for, as he said, he was convinced that no one could be a proper judge in his own case. The judgment of the group was that immediate amputation of the leg was necessary, and so the instruments were made ready for the operation.

Those were days before antiseptics were used to treat wounds. More than a hundred years were to pass before Lister was to show that infection in wounds is due to bacterial contamination and can be controlled by antiseptics. In Dr. Pott's time a compound fracture was a very serious wound indeed, because of the blood-poisoning that almost always resulted. So amputation was resorted to in such cases. But since the surgeons in their operation made no provision to control infection, the outcome was likewise frequently fatal, although less often so than in cases where amputation was not performed.

The prospects for Dr. Pott's recovery were indeed bad. He consented to the operation, to be undertaken, of course, without anaesthesia. Just before it was to be commenced, his old teacher at St. Bartholemew's Hospital, Dr. Nourse, arrived. He examined the injury and gave as his opinion that it might be possible to save the leg without operation. Consequently, the broken bone was brought into proper position and held there with bandages. No serious infection developed in the wound, and after a long convalescence Dr. Pott was able to resume his practice.

But in a way, the injury was for him a fortunate occurrence. In the weeks during which he lay in bed he conceived the idea of writing books and papers on surgical matters. And so, at the age of forty-three, he embarked on his career as a medical author, a very successful one. In his pages are to be found the first exact description of the kind of fracture that he suffered from, a rather common variety. In his honor, it has ever since gone by the name

of Pott's fracture—your physician of today uses that term in speaking of it.

It may seem a trifle gruesome to think of honoring a man by giving his name to a disease; but physicians do not look on the matter in that light. Explorers are often honored by having their names



THE ZEALOUS STREET WATCH

After a drawing by Gillray. Fielding, the novelist, was instrumental in improving the police conditions in eighteenth-century London. In 1784 he was appointed justice of the peace for Middlesex and Westminster, an office which gave him £300 a year of, as he said, "the dirtiest money on earth." *His Inquiry into the cause of the Late Increase of Robbers*, 1751, was one of the forces leading to the police reform effected by Peel.

used to designate the lands which they have discovered and described. Why should not physicians receive a similar recognition for the diseases and injuries that they separate and describe? Nor is Pott's fracture the only malady which bears his name. He was the first to describe, accurately, a much more serious condition known now as Pott's disease.

His first paper on the subject was called *Remarks on That Kind of Palsy of the Lower Limbs Which is Frequently Found to Accompany a Curvature of the Spine*. He defines the condition in these words:

The disease of which I mean to speak is generally called a palsy, as it consists in a total or partial abolition of the power of using, and sometimes even of moving, the lower limbs, in consequence, as is generally supposed, of the curvature of some part of the spine.

Dr. Pott's interest was held particularly by the paralysis; he was to recognize later that deformity of the spine occurred in many instances where there was no paralysis. His first task was to call attention to the many cases of seemingly hopeless paralysis in which all attention had formerly been directed to the leg. He pointed out that the real seat of the trouble lay in the spine. The vertebræ of some section became diseased and crushed down upon each other under the weight of the upper part of the body. An angular outward bend in the spine resulted, and, in occasional cases, the spinal cord, which passes through and is protected by the arch made by the backward extension of the vertebræ, was pressed upon. Paralysis of the legs, sometimes only temporary, resulted from this interference with the nerve fibers that ran in the spinal cord and became the nerves of the legs.

The condition occurred most commonly in a child under ten years of age. If he survived, the diseased vertebræ often healed, but the child was left with a permanently deformed back, the condition called hunchback, or Pott's disease. Nowadays it is the deformity rather than the paralysis that concerns us, for only rarely does the condition become so severe as to cause permanent paralysis.

Dr. Pott recognized the cause of the disease, at least to the extent of calling it scrofula. We know now that scrofula is tuberculosis and that Pott's disease is tuberculosis of the spine.

The deformity, Dr. Pott pointed out, was not due to a dislocation of the vertebræ; such a state could be produced only by great force; so great, in fact, that the vertebræ must usually be broken in order to produce the dislocation. Paralysis would instantly follow such a condition. The process was rather one which developed slowly and

gave rise to few striking symptoms until well developed. What happened was this: the front portion of the vertebræ, sometimes only one or two and other times many in a group, became diseased. The bone became soft and spongy, the condition resembling somewhat that found in a decayed tooth. The portion of the body above the diseased area weighed upon the softened vertebræ. They gradually yielded to the pressure, but as the rear portion was rarely

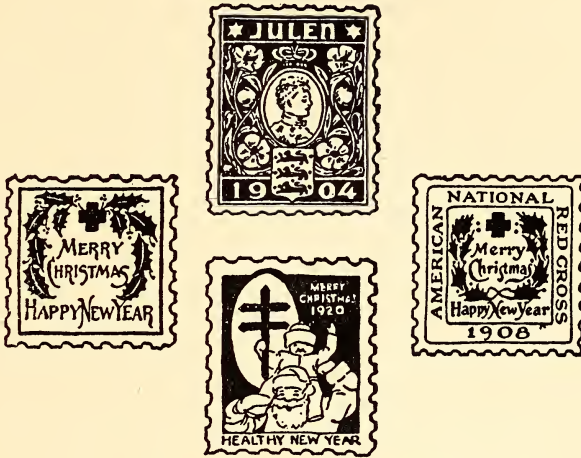


TRACING FROM AN ANCIENT EGYPTIAN TOMB
Showing a man with Pott's disease.

affected, the collapse was only in the front of the vertebræ. Consequently, the spine was pushed outward; an angular protuberance in the back resulted. The child's stature was diminished as its trunk was thus made shorter. Finally, the bones healed, but were knit together in the deformed position, and the permanent condition of hunchback was produced—a state once uncontrollable but now preventable.

We know that the tubercle bacillus is responsible for this condition. This is the same organism which produces consumption. Al-

though it very commonly attacks the lungs, nevertheless, it may attack almost any part of the body—the bones, the skin, the brain, the joints, or any of the internal organs. The factors that determine the locality are not known.



THE CHRISTMAS SEALS

The Christmas seal at the top was the first of its kind. The idea of selling Christmas seals was originated in 1904 by a postal clerk in Denmark; the proceeds of the sale were used to establish a children's hospital in Copenhagen.

In 1907 Miss Bissell of Wilmington, Delaware, had a stamp printed (left), and used the proceeds of the sale to build a tuberculosis pavilion. In the following year she induced the American Red Cross to conduct a nation-wide campaign, using the stamp at the right; the funds were used to assist the work of the National Tuberculosis Association.

In 1920 the sale of stamps passed from the auspices of the Red Cross to that of the National Tuberculosis Association. The first stamp to bear the double-barred cross of this organization is shown at the bottom.

The National and affiliated State Tuberculosis Associations are our greatest forces in the struggle to eradicate tuberculosis. Their work is carried out entirely with the funds obtained from the sale of seals. In 1904, the year the organization started its work, there were in the United States some 240,000 deaths from tuberculosis; in 1929 the figures had fallen to 92,000.

In order to produce any form of tuberculosis the child must first be infected: the tubercle bacilli must enter its body. This infection comes from people who have consumption—parents, nursemaids, or school companions in whom the disease has not been detected and who, therefore, are a menace to everyone about them,

since they do not take the proper precautions to prevent the spread of their disease.

After infection has occurred, the bacilli live for a long time in the child's body; they may or may not set up serious disease. Frequently, their growth is arrested and they lie dormant, perhaps for many years. Sometimes, however, active disease is produced. The tubercle bacilli multiply, and the part of the body in which they are centered is destroyed. The locality determines the nature of the disease; in the lungs, it is consumption; in the spine, it is Pott's disease.

Some day tuberculosis may be eradicated by controlling the spread of infection, but until that time prevention of serious tuberculosis must in part depend upon continual vigilance over the children already infected. The presence of infection is detected by the simple procedure of the tuberculin test, applied merely to the skin. For those children who are found to be infected the minimum supervision consists of periodic medical inspection, with the use of X-rays to examine the chest and spine.

When by these measures tuberculosis is found to be developing, it is not a hopeless condition—far from it. If the disease is detected early, it can be arrested. No invalidism or deformity need result. But early detection is imperative.

In the days of Percival Pott there was no way of preventing hunchback, following tuberculosis of the spine. He tried to do so with a method that seems to us as primitive as the stretcher on which he was carried home after he had broken his leg, as barbarous as the civic conditions of his time. He made cuts in the skin along the spine and produced an infection there, an old-fashioned and useless method of treatment. The best efforts of the greatest surgeon could not prevent hunchback then.

Today, if the infection is detected early, and all the means of doing so are now available, deformity can be prevented. The spine is so held in place by appliances that it cannot be bent out of shape. At the same time the child is treated for tuberculosis. When he recovers, his back is straight. But to achieve this desirable end, to take away forever from our midst the deformity of hunchback, it is not sufficient that the physician have at hand the means. General co-

operation, the most difficult measure of all to obtain, is necessary. The tuberculous child must be found out. Indifference, inertia, must be overcome. The tuberculin test, the medical examination, and X-rays must be applied to all of our children if we are to prevent invalidism, deformity, and untimely death.

Part Six

THE PROGRESS OF SURGERY

CHAPTER TWENTY-EIGHT

AN AMERICAN DISCOVERY



IF YOU were able to go back a hundred years to visit a hospital of that time, you would be unpleasantly impressed by many things there. But I think the one thing that would impress you most, and would always haunt your memory, would be the old-time operating-room. You would be revolted and horrified, for there you would both see and hear patients operated on—in all the operations—without any anesthetic to relieve their pain. Surgery is a very old practice, but the use of anesthetics to deaden the pain of operation is very new.

Today the administration of anesthetics is a highly developed branch of the medical sciences. Many substances are now available which will produce temporary insensibility to pain. Ether, nitrous oxide, ethylene, and other volatile liquids and gases are inhaled safely to produce unconsciousness. Novocaine and other drugs are injected under the skin or along nerves to produce local insensibility without unconsciousness.

Anesthesia is now naturally assumed as a necessary part of every painful surgical or dental operation. It is now such a commonplace procedure that we have ceased to marvel at it or be thankful for it. Yet after a brief visit—a very brief one—to an operating-room of a hundred years ago, I think you would agree with me that the discovery and demonstration of surgical anesthesia constitute the most beneficent innovations that have ever fallen to the lot of mankind.

Anesthesia was an American discovery. What is more, it was discovered twice within four years by two different men before it became widely used. A Dr. Long, of Athens, Georgia, was the first

man known to have used an anesthetic. In 1842 he gave ether to a patient and performed an operation on him. The bill for that operation still exists—\$2 for the operation and 25 cents for the ether. In 1842, Athens, Georgia, was almost a frontier town. News traveled slowly in those days. Before Dr. Long's use of ether became known to anyone except those in the vicinity of Athens, the anesthetic properties of ether had been rediscovered and demonstrated in public in 1846 at the Massachusetts General Hospital at Boston.

Dr. Long's discovery died for want of publicity. A discovery of much less importance would today reverberate around the world in twenty-four hours. But those days of the 'forties were old-fashioned days of slow transportation. They were the days of our grandmothers—days of the covered wagon, hoopskirts, candles, stage-coaches, and Indian raids—all very obsolete and slow from our sophisticated viewpoint. But I don't know of any discovery made in our modern times that is as important or is as humane as the introduction of anesthesia.

It is worth while to pause for a moment, I think, to see what was going on in America in the 'forties and to see what sort of people those were who gave us anesthesia, but had to discover it twice before they knew they had it. Let us glance over a newspaper of that period. There's the *New York Tribune*, edited by the great Horace Greeley. All the news that was attainable is there, pared down to the very bone of essentials and crowded into two sheets of fine type. Three lines are devoted to a robbery on Broadway that would today be expanded into a full page but give no more news. There are no headlines about Dr. Long's discovery; in fact, there are hardly any headlines at all. But familiar names show up here and there—amazingly bright people for an age that seems so poky and out of fashion; and there are amazingly important things going on, too. Daniel Webster has resigned as Secretary of State. Here's a note about the treaty with England which gave us Oregon. Asiatic cholera is in the city of New York again. Texas, Florida, and Iowa have just been admitted as states. The Mexican War is under way. Over here in this last column is part of a poem by a young English poet, one Robert Browning, who is coming into some distinction in a small way. There's a notice that Whittier's newest

poem, "The Ship Builder," will appear next week in *The New Yorker*, a very elegant weekly newspaper, so we're told, published by the *Tribune*. Down the center of the front page is a column installment from the latest serial of one Charles Dickens, called "Dealings with the Firm of Dombey and Son."

On the second page there is an item headed: "First Dispatches to the *Tribune* by the New Magnetic Telegraph." Electric telegraph



VELVETS! VELVETS!
MAZARINE, BLUE AND BLUE-BLACK VELVET HATS, CLOAKS, &c. at 96½ Bowery.—The subscriber begs leave to inform the Ladies of New-York that he has just received a quantity of the above named articles at his Straw Hat Manufactory, 96½ Bowery and that he has also on hand an assortment of Silk and Velvet Ribbons and French Feathers and Flowers, suitable for Trimming Hats; all of which he intends selling as low as they can be found in the city. Ladies are invited to call and judge for themselves. THOS. YOUNG. n9 1w*

BUFFALO MONEY AT PAR.—The subscribers will take Buffalo Money at par, without any addition to former prices, for their well selected stock of Dry Goods, consisting in part of Silks, Silk, Brocho and Cashmere Shawls, Merinos, Taglioni's, Bombasins, Velvets, Flannels, Cloths, Cassimeres, Prints, &c. o30 tf GERARD & KLINCK, 167 Spring st.

American Antiquities and Researches into the Origin and History of the Red Race. By Alexander W. Bradford. In one volume, 8vo. This day published by DAYTON & SEXTON, 91 Nassau street, corner of Fulton. o31

Medicines of Best Quality—Approved Popular Remedies, Leaches, English and French Perfumery, Soaps, Brushes, &c., for sale by J. & T. CODDINGTON, Druggists, o13 1mis* 227 Hudson st., corner of Spring.

NEWSPAPER ADVERTISEMENTS IN 1841

A portion of the front page of the *New York Tribune*, when fashionable stores were on the Bowery and the shopping center on Spring and Nassau Streets.

has just started to function, and the first wires have been stretched from Washington to Baltimore and to New York. Napoleon Bonaparte rejected the telegraph as a foolish invention; his vision could not have been great.

Half the front page is devoted to advertisements of patent medicine. A whole column is given to Sand's Sarsaparilla. Those were days before the Pure Food and Drugs Act and the regulations against fraudulent claims in interstate commerce. And what claims that advertisement makes for sarsaparilla—an absolutely reliable, infallible cure for scrofula, ringworm, exposure, imprudences of life, and constitutional disorders, or what have you. You can almost see the flicker of the whale-oil torch of the vagabond medicine-

vender on the street corner. I nearly wrote gasoline torch, but there wasn't any gasoline then, for it wasn't until the next year that James Young first distilled petroleum.

There are announcements of inventions and scientific discoveries. Howe has received a patent for a thing he calls a sewing-machine. Edgar Allan Poe is playing a hoax on the public through the columns of the *Sun*: A telescope in Florida that brings the surface of the moon within a yard of the earth and brings a delegation of serious-minded professors from Yale University to investigate the story.

But there's no mention of that great beneficent discovery that lies asleep in Athens, Georgia. Nor is there even a suggestion of the events that are moving from New Haven, Connecticut, to Hartford and on to Boston, that will eventually culminate in an independent discovery and full demonstration of surgical anesthesia.

What would seem even stranger to us, after knowing of anesthesia for nearly eighty-five years, is that there is no protest in the papers against the horrors of surgery without some means of deadening pain. There are no appeals there for men to turn their attention to the elimination of that suffering. No—it was an accepted part of the life of our great-grandparents. Hardships are apparent only when some means of relief brings them into contrast. I suspect that some of the inconvenience and suffering that we now accept and tolerate as inevitable will some day be looked back upon with the same horror with which we now look back upon surgical operations in those days before anesthesia. Operations had to be performed. The ancient Egyptians and the Greeks of Homer's time practiced surgery—a surgery of necessity. In America in 1846 it was the same surgery—done better, but done only for the direst necessity. Men often preferred death to the operation that might save their lives, for in that operation they would be tied down so that they could not escape and crushed back upon the table by strong attendants. I have read documents left by men of those days describing their sensations before, during, and after operation. They are appalling documents, and that is why I call the discovery of anesthesia one of the most beneficent discoveries that was ever made.

It was the first of those great triumphs in medicine which were to make the last half of the nineteenth century one of the greatest epochs in the history of civilization. In 1846 the bacterial cause of disease was still unknown, preventive medicine was not yet founded, sanitation was little more than superstition, and antiseptics were almost undreamed of. Some few physicians were learning to use the stethoscope, but mostly it was experience and shrewd guess that guided them to what knowledge they could obtain of what was wrong inside the bodies of their patients.

I have wandered away from what I started to tell about—the events that were moving along all this time, from New Haven to Hartford and to Boston, without even a line in the paper to note their progress. If we wanted to trace these events back to their very beginning we should have to start in England in 1800. In that year, Sir Humphry Davy of Penzance discovered nitrous oxide, and in experimenting on himself with the new gas he produced temporary unconsciousness. Forty-four years passed by. And then, one evening, Horace Wells, a dental surgeon from Hartford, Connecticut, came to New Haven to hear a lecturer named Colton talk on the properties of nitrous oxide. Lectures on science were a fad in those days, and Colton's audience was a general one. To amuse them Colton called up a young man and asked him to inhale the nitrous oxide. The young man under the influence of the gas staggered drunkenly about the stage. Wells, from the audience, observed that he struck against a chair and injured himself slightly, but gave no sign of pain. The nitrous oxide had deadened his sensations. An application arising from this observation occurred to Wells. He returned home and administered nitrous oxide to some of his dental patients. But nitrous oxide is a difficult anesthetic to administer without proper apparatus, and many of the attempts he made were unsatisfactory.

Wells reported the progress of his work to William Morton, a friend and former partner. Morton practiced dentistry in Boston and attended the Harvard Medical School. Both Wells and Morton had strong personal reasons for their interest in any method which promised relief from the pain caused by extracting teeth. They had perfected a plate to hold false teeth, but in order to use it, it was

necessary to remove all of the old roots left in the jaws from decayed and broken teeth. Many patients because of the pain involved refused to have these old roots extracted, and so they left them in and had their dental plates formed over them. That's one reason why our great-grandparents had so much rheumatism, but there was no X-ray then to show the abscesses about the teeth, nor was there any knowledge of what infection is.

Wells and Morton realized that the introduction of their dental methods necessitated finding some way to deaden the pain of extraction. After the failure of Wells with nitrous oxide, Morton was on the lookout for some substitute. His studies in the Harvard Medical School brought him in contact with Dr. Charles Jackson, who taught chemistry. Morton learned, by questioning him, that ether when inhaled had properties similar to those of nitrous oxide. Jackson had never taken advantage of his knowledge to use ether for the relief of pain, but Morton saw the possibilities that ether presented. He experimented with ether at his home, first on the family dog and then on himself. His next step was to use it in his dental practice, which he did successfully late in September of 1846.

Morton, as I said, was a medical student, and after his success with his dental patient his mind quite naturally turned to the possibility of using ether to lessen the frightful suffering from surgical operation. He called on Dr. Warren, who was the senior surgeon of the Massachusetts General Hospital. Morton told him of his use of ether and his success in relieving pain, and he asked for an opportunity to give a demonstration of his method on a patient undergoing surgical operation. Dr. Warren consented. The date of the demonstration was set for October 16, 1846. News of the attempt spread, and on the appointed day a considerable number of spectators gathered in the amphitheater of the operating-room. The patient was brought in. Dr. Warren was there, dressed in formal morning clothes, for surgeons of those days did not wear gowns, masks, and rubber gloves. His assistants were about him, and to one side stood the guards whose duty it was to hold down the struggling and shrieking patient. But Morton was not present. Knowing and amused glances passed among the spectators. The



TRANSPLANTING TEETH
From a caricature by Roclandson

young man had apparently thought better of his presumptuous claims and lost his nerve at the last moment. Dr. Warren advanced to the side of the anxious patient. He picked up his knife. Gravely he faced the spectators and said, "As Dr. Morton has not arrived, I presume that he is otherwise engaged." His knife descended toward the man on the table.

At that moment Morton entered. He had been delayed, he said, in perfecting his apparatus for administering ether. Dr. Warren bowed and stepped back; he indicated the man on the operating table, and said: "Well, sir, your patient is ready." And then, amid the silence of the spectators, surrounded by unsympathetic and derisive faces, Morton proceeded to administer ether. In a few moments he looked up and said, "Doctor Warren, *your* patient is ready."

The incredulous audience watched in silence as the incision was made through the skin. Dr. Warren paused. But the patient neither struggled nor cried out. The operation was continued and completed, and still the patient gave no sign of pain. Dr. Warren slowly laid down his instruments. He turned to the startled spectators. His words show only too clearly what thoughts had been in his mind. He said, "Gentlemen, this is no humbug."

And so surgical anesthesia became a demonstrated reality. Anesthesia, did I call it? That word wasn't even known then, for the condition was new and there were no words in the language to describe it. The men concerned turned to our great physician and scholar and author, Oliver Wendell Holmes, and asked him for a name, and he gave us *anesthesia*, *anesthetic*, and *anesthetist*.

Surgical anesthesia brought to an end one of the great tribulations that had faced men in all ages. Its use in the last eighty-five years has made modern surgery possible. It has spared men more pain than that caused in all the wars of a century. And isn't it peculiar that we know the names of those wars and the generals who fought in them—we erect great permanent triumphs to their glory—and here, on the other hand, was a great, beneficent discovery, and yet no school history records the names of Long, Wells, Morton, and Warren? That old operating-room is still there at the Massachusetts

General Hospital, used now as a lecture-room for nurses. One small, local, annual ceremony of Ether Day recalls the names to those who know and remember. But even though their names are unknown to most of us, every surgical operation in every hospital in every land is a ceremony of triumph in their memory.

CHAPTER TWENTY-NINE

A REFORMER WITH A SENSE OF HUMOR



OW that anesthesia is an accepted part of every painful surgical procedure, it appears as one of the most humane contributions of science. And yet anesthesia was not welcomed by everyone. Instead it met violent opposition. The prejudice was strongest against the use of anesthesia for mothers. And it is a most striking fact that the opposition was not from stupid and ignorant men, but instead from men who held public positions and who were influential in public matters.

This opposition to anesthesia is not an isolated example, nor a peculiar and unexpected reaction. Rather it is the common occurrence. It is an expression of the general attitude shown toward most great, humane medical innovations.

If you have ever considered the lives of great benefactors of the human race, you will know what oppositions these men encountered. Their peace and happiness, and often their lives, were sacrificed for a cause which was to benefit humanity. Everyone instinctively hates a radical in any field of endeavor. It's human nature to do so. I may seem cynical, but perhaps you have had experiences that have shown you that what I say is true. Perhaps you have aligned yourself actively with some great humane cause that seems to you to be reasonable and logical. You know how you were received by the very people whom you sought to benefit. Generally you were received with complete indifference. If you succeeded in making yourself noticed at all, you were merely called a crank or a fanatic.

I can well imagine that Christopher Columbus, before he sailed to this country, was looked upon as the worst sort of crank by most

of the people who knew him. He was successful, but there are also many martyrs in the pages of human history. If the cause you supported gave indications of advancing, the indifference toward you changed to opposition. Your opponents—and that included nearly everyone—responded to your logic, not with logic, but instead, with violent emotion. You and your cause were denounced together. The opposition of the pack may have destroyed you. If you fought back and forced your cause, it may have been accepted, but you were then most likely forgotten. If some fifty or a hundred years from now some one were to write a few lines about you in recognition of your work, the chances are that only a few of those who read them will have ever heard of you before.

I am going to write here about just such a man—the Scotsman, Dr. James Y. Simpson. He bore the brunt of the opposition to the use of anesthesia. He weathered the storm of that opposition, and what is still more unusual, he lived to see the general acceptance of the cause he championed.

These events occurred in the middle of the last century. They commenced with the public demonstration of ether anesthesia in October, 1846, at the Massachusetts General Hospital of Boston.

A few weeks later the report of this beneficent discovery reached England and Scotland. It immediately caught the attention of Dr. James Y. Simpson.

Dr. Simpson was professor of obstetrics at the University of Edinburgh. He had, throughout the city, a very extensive practice in his specialty. He was a kindly man, and he had long hoped for some means of relieving the suffering of mothers. Ether seemed to him a likely possibility. He immediately tried it on one of his patients, and was the first physician to use anesthesia for childbirth. To his delight he found that it did relieve some of the pain, but he discovered also that there were objections to ether. Ether, as he administered it, made his patients choke and cough. With his characteristic enthusiasm he set about immediately to find some other anesthetic which would not be irritating. He soon discovered that chloroform could be used as an anesthetic.

There is a story about his discovery of the anesthetic properties of chloroform. I shan't vouch for the truth of it, but I'm going to

tell it because it illustrates the character of Simpson. He asked a chemist in Liverpool—so the story goes—to supply him with some fluids which might possibly have the same effects as ether. One of



ADAM'S ANESTHESIA

From an old manuscript. As in all such representations of the birth of Eve the deep sleep of Adam—anesthesia, as Dr. Simpson said—is faithfully represented. The tree with its single fruit is shown.

the fluids which he received was chloroform. Simpson then invited a number of his friends to come and dine at his house. During the meal he said nothing of his intention, but after dinner, while the

guests were still at the table, he had his fluids brought in. He poured them into tumblers, which he set before his guests. He then asked them to inhale the vapors which rose from the fluids. The guests were obliging in the matter, and they leaned over the table and sniffed at the contents of the tumblers. Nothing of interest occurred until they came to the chloroform. Then one by one the guests relaxed in their chairs, and either fell forward with their heads upon the cloth or else slid from their chairs and disappeared under the table. Nothing more was needed to demonstrate the potency of chloroform as an anesthetic.

Incidentally, Dr. Simpson was not original in the use of dinner guests as experimental animals. The Borgias had set him an example in this line some centuries before. The practice has continued, if one may judge from newspaper accounts, since prohibition; there is a distinct health hazard in being a dinner guest these days.

Dr. Simpson, a day or two after his dinner party, used chloroform on one of his patients during childbirth. He was so struck with the relief from suffering that resulted in this case that he immediately wrote and published his experience so that other physicians could share this humane innovation with him.

His intentions were noble and generous, and his enthusiasm in this effort to relieve pain was sincere. But his method of procedure was naïve. He did not know the public. He thought that they, like him, would become enthusiastic over a means of relieving suffering, and particularly the suffering of women. He was mistaken. His innovation was not received as a public benefaction. He was not received as a public benefactor. Instead, his well-meaning efforts aroused a storm of opposition and hostility. Both he and his innovation were damned from every pulpit in Scotland. Pamphlets were published and scattered broadcast telling people, and particularly mothers, that it was wrong and sinful to use chloroform or any other anesthetic to relieve pain. So strong is the contagion of this emotional reaction against innovators that some members of the medical profession, even, forgot for the moment the nature of their calling, and were so carried away by this common reaction of hu-

man nature that even they, so they said, doubted the need and propriety of using anesthetics for mothers.

A lesser man than Simpson would have been crushed by the opposition and hostility he encountered. But as it was, no one could have been found better suited to enter the list in favor of women. Simpson enjoyed a fight in a good cause. He was essentially a reformer, but he lacked that dour pessimism and readiness of martyrdom so common among reformers. He was a reformer, but one



THE BIRTH OF EVE

From the *Hortus Sanitatis*, published at Strassburg in 1499. Usually when animals are represented in this scene the traditional snake is shown, but here the hog holds the apple in its mouth and the tree is bare.

with both feet set solidly on a foundation of common sense; one with a genial love of his fellow men and a healthy disposition to argument. Rarest of all, he was a reformer with a sense of humor.

Now remember that this attack against Dr. Simpson occurred eighty-five years ago. Times have changed since then, and men have become more liberal and more broad-minded. Today opposition to innovations still arises, but the Old Testament is not now so often used as an argument against innovation as it was in the time of Simpson. The attack against Simpson and his use of anesthesia to relieve in part the pain of mothers was based upon the Biblical

curse placed upon womankind: Genesis iii: 16—" . . . in sorrow thou shalt bring forth children." According to the prevailing theological interpretation, sorrow meant specifically pain. Pain was ordained for women by an express command. Any effort to relieve such pain was a sacrilege.

Dr. Simpson published a reply to the objections brought against the use of anesthetics. He was a busy practitioner. His writing was done in snatches at the bedsides of his patients. He wrote in a sympathy engendered from the groans of those whose beliefs and scruples prevented them from accepting the relief from pain that otherwise he could have afforded them. Simpson's reply, called *Answers to the Religious Objections Against the Employment of Anesthetic Agents in Midwifery and Surgery*, is a masterpiece of its kind.

After presenting the justice of his own stand, he carries the battle into the field of his antagonist. He points out that men have opposed every beneficent innovation that was ever advanced. And in a cowardly fashion they have always tried to warp religion to cover the deficiencies of their own logic.

He does not dwell upon the essential sacrilegiousness of such efforts to misplace the cloak of religion, but instead cites examples. He points out that vaccination against smallpox was opposed by men who used a sort of religious argument against it as profane violation. Winnowing machines, which farmers use to separate chaff from grain, were likewise opposed. These machines pass a current of air across a stream of grain and blow away the lighter chaff. It was argued that God alone raised the winds and that it was impious and irreligious for man to do so by his own efforts. In the sixteenth century, when men were first speculating upon the advantages of cutting a canal through Panama to unite the Atlantic and Pacific Oceans, they were warned against the attempt on the ground that it was irreligious to do so, and any attempt would meet with merited disaster.

He cites further the opposition to the introduction of table forks. In the reign of the early Stuarts in England, forks were introduced from the Continent. Prior to that time the fingers or the point of the knife were the only means used to transfer meat and other

solid foods from the dish to the mouth. Forks were an innovation and their use called down the customary denunciation. Concerning this incident, D'Israeli says that the use of forks was so much reprobated in some quarters that some prominent, but uncleanly, men denounced their use as "an insult on Providence not to touch our meat with our fingers."

Table forks, the Canal, the winnowing machine, and vaccination are no longer denounced on quasi-religious grounds, and, fortunately, neither is anesthesia.

Simpson was not content to let matters rest with mere examples. He concludes his paper on anesthesia with a bit of irrefutable logic. He takes the weapons of his opponents from their own hands. He shows that the first surgical operation ever recorded was carried out under anesthesia. Let me quote directly from Simpson's paper. He says:

Besides, those who urge, on a kind of religious ground, that an artificial or anesthetic state of unconsciousness should not be induced merely to save frail humanity from misery and torture of bodily pain, forget that we have the greatest of all examples set before us for following out this very principle of practice. I allude to that most singular description of the preliminaries and details of the first surgical operation ever performed on man, which is contained in Genesis ii: 21, and which reads: "And the Lord God caused a deep sleep to fall upon Adam, and he slept: and He took one of his ribs, and closed up the flesh instead thereof."

In this remarkable verse the whole process of a surgical operation is briefly described. But the passage is principally striking as affording evidence of our Creator Himself using means of saving poor human nature from unnecessary endurance of physical pain.

The deep sleep of Adam was anesthesia! The controversy was at an end so far as the Scotch clergy were concerned.

There remained, however, the opposition of some members of the medical profession. But that was a family argument, all within the profession. It was bitter but brief, and fought out in the privacy of medical journals.

While Simpson was waging his battles in Edinburgh, a less picturesque struggle was going on in America. Dr. Channing of Boston was the champion of anesthesia in this country. The opposition he encountered was not based on a religious ground, but on one

which would seem totally absurd and ridiculous if it were not for the fact that the same argument was raised again as late as 1921. The argument against using ether for mothers was the sophistry that the suffering involved is one of the strongest elements in the love which the mother bears for her child. In other words, the maternal instinct is engendered in suffering. Needless to say, the advocates of this theory were elderly women, spinsters, and men. Men particularly, for some reason, always dislike to see women relieved of any of the suffering or handicaps, the elimination of which might destroy the illusion of inferior sex.

Nothing was heard in the argument from the persons really involved—that is the way in many arguments. They were too busy tending to the wants of the brood they already had and making preparations for the new addition, to find leisure for a philosophical discussion of maternal love. Possibly they may have wondered where the paternal love was to be engendered. Now and then they may have wished covertly for a revival of the custom of some native tribes, among whom the husband was hung up by the feet to dangle head down throughout the hours of his wife's confinement.

There is one outstanding point in these controversies that arise over humane innovations. Men of the medical profession have made the discoveries which prolong life, prevent disease, and relieve suffering. But their task has not ended there. They have sacrificed their own happiness and peace to bring these measures into general use against the obstacles of indifference and hostile opposition. They have done these things without hope of reward.

Dr. Simpson was among the few physicians who have lived to see the acceptance of the causes they championed. Within two years after his paper on the use of anesthesia he was able to report that between forty and fifty thousand persons in Edinburgh alone had received anesthesia for surgical operation or childbirth.

And then, in April of 1853, there occurred an event that had a more profound influence on the general acceptance of anesthesia than the work of both Simpson and Channing. Queen Victoria accepted chloroform at the birth of her seventh son, Leopold. And such was the influence of the example of royalty that formal op-

position to anesthesia ceased altogether in Great Britain thereafter, and to a large extent in America also.

Dr. Simpson was knighted, and there is a story invented concerning this occasion. Sir Walter Scott, the novelist, it is said, wrote to Simpson saying that, in view of his efforts to relieve the pain of motherhood it was only fitting that he use on his coat of arms the picture of a new-born baby and underneath it the motto, "Does your mother know you're out?"

CHAPTER THIRTY

"I DRESSED HIM, GOD CURED HIM"



CONTRAST has been made between two men who were contemporaries—Edward Jenner and Napoleon Bonaparte. Here is what James Simpson wrote about these two.

During the long European wars connected with and following the French Revolution, it has been calculated that five or six millions of human lives were lost. In Europe, vaccination against smallpox has already preserved from death a greater number of human beings than were sacrificed during the course of these wars. The lancet of Jenner has saved far more human lives than the sword of Napoleon destroyed. On these devastating European wars, England lavished millions of money, and freely bestowed honors, peerages, and heavy annual pensions upon the soldiers who were most successful in fighting her battles and destroying their fellow men. She grudgingly rewarded Jenner with thirty thousand pounds for saving thirty thousand of her subjects annually.

Eighty years and more have passed since that contrast was drawn, but the regard in which these two men are held has not changed materially. We have made but little progress in eradicating the savage instinct—the twist of human nature—that makes us admire ruthless destructive power, but leaves us indifferent to constructive humanitarianism.

Napoleon and Jenner—what a contrast! Napoleon is so well known that even the idiosyncrasies of his posture and dress are common knowledge. In our schools his life is studied by adolescent boys who make him their hero. Jenner, on the other hand, is unknown even by name to most people. Few indeed would recognize a portrait of this English country gentleman, blond and blue eyed, a bird-fancier, a musician on the flute and violin, a minor poet of some distinction, and one of the supreme benefactors of

all humanity. He originated vaccination against smallpox, the mark of which you bear upon your arm. Perhaps if personal worth were judged on the basis of benefit to human welfare, Napoleon's greatest claim to distinction would come from the fact that he was an ardent supporter of Jenner.

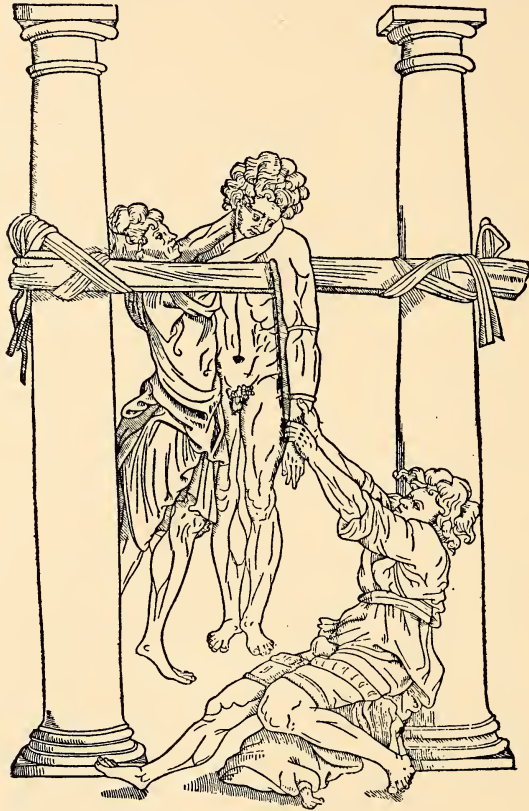
Powerful and awe-inspiring characters fill the pages of history; the noble humanitarians, the gentle benefactors of the human race, are crowded out and lost to memory. We are still savages in our tastes; we are more interested in death and destruction than we are in peace and life. As an illustration I am going to make another contrast—on the one side, three kings and two queens; on the other, a barber. You will all know the kings and queens when I mention their names, for history gives much space to them, but most of you, I think, have never heard of the humble barber whom historians generally fail to mention. The kings are Francis II, Charles IX, and Henry III, of France; the queens, Catherine de' Medici and Mary Queen of Scots. Ambroise Paré, the father of French surgery, is the barber.

The time is the sixteenth century, and the country, France. Great political changes are under way. France, until a few years before, has been in the hands of feudal lords. Each one of these rulers has governed a territory, a feudal domain, making some concession to the kings of France, or defying them and aligning with their enemies, as strength and circumstances have dictated. The power of these lords has been finally crushed and the country unified under the kings of the Valois family; but the influence of the once powerful lords is still felt, factions exist, and undercurrents of political unrest lead to treachery, intrigue, and civil wars.

To the turbulent French court there comes in the year 1533 an Italian girl, fourteen years old, Catherine de' Medici, an orphan niece of Pope Clement VII. She is brought from her home and married to the French prince, the Duke of Orléans. She receives scant courtesy and little consideration in her new surroundings. Hers is a political marriage, and the attentions of her husband are already fully occupied with the beautiful Madame de Brézé, better known as Diane de Poitiers, the courtesan, some twenty years his senior.

Very romantically the initials of these two are entwined over

the doors and windows of the houses where they lived and played, but there is no romance or joy for the neglected and sullen wife.



SETTING A DISLOCATED SHOULDER

From the surgical works of Guido Guidi, 1544. Wood-cuts for this book were made by Jan Santarino and Francesco Primaticcio. Guido Guidi was a friend of Benvenuto Cellini's. The two Florentines, called to Paris by Francis I, lived together. Cellini in his *Memoirs* says of Guidi: "I took him to my castle. . . . We enjoyed our mutual friendship during all the years I stayed at Paris. . . . The building also contained some little dwellings inhabited by different sorts of men, among whom was a printer of books of much excellence in his own trade . . . and he was the man who printed Messer Guidi's first fine book on medicine"—the one from which the illustration is taken.

Moreover, married ten years, she still is childless and there is talk of annulling the marriage and sending her back to Italy. Eventually

the king dies and her husband comes to the throne, as Henry II. By this time there are children, but still Diane de Poitiers rules the husband, and the queen can only sulk and scheme. Then one day Henry, for the amusement of the court, displays his athletic prowess in a tournament with the captain of the Scottish guard, Gabriel de Montgomery. The lance strikes against the royal visor, the shaft splinters, and fragments of the wood are driven into the king's eye and on into his brain. To his aid are called Vesalius, the great Belgian anatomist, and Ambroise Paré, the barber-surgeon of France. But the case is hopeless. The reign of Henry ends and also that of the courtesan, Diane de Poitiers.

Catherine's young son, Francis II, comes to the throne. Although still a child, he is married to Mary Queen of Scots. In his minority Catherine is regent but has no power, for the nobles of the Guise family rule through their relative, Mary, the young queen. A year and a half later the king has an earache, and then a serious ear infection. Catherine summons Paré, but there is little he can do, for a brain abscess has developed. The king dies. The disappointed lords accuse Paré and the queen of poisoning him, but there is no foundation for their charge, so far, at least, as Paré is concerned.

The second son, Charles IX, now comes to the throne, and Catherine's power rises. But her strength lies only in intrigue; she schemes, she corrupts, she poisons, she assassinates. Civil wars, religious wars, and foreign wars tear France apart. Under Catherine's instigation her son allows the perpetration of that horrible massacre of Saint Bartholomew's Day, after which many Huguenots go into exile, to America's gain and the great loss of France. Charles dies of tuberculosis, and his brother, Henry III, takes his place. Wars and treachery continue. Finally, Catherine dies, Henry is assassinated, and the Valois reign is at an end.

Such is the picture of the time as presented by the conventional historian; a record of human ignominy, cruelty, and barbarity. But behind the scenes, in court and on the battlefield, moves the barber-surgeon whom I have mentioned—Ambroise Paré. The fact that he was allowed to preside at the deaths of three kings in succession, and still live, attests to Paré's sterling character and to his worth.

It is even said that he was a Huguenot, and the only one spared by royal edict on the night of the great massacre.

Now I call Paré a barber and a barber-surgeon, for those are the titles he went by. Surgery in his time did not hold the dignified position that it does today, but was an occupation often relegated to the hands of executioners, bathhouse-keepers, and strolling vagabonds, as well as being a regular function of the barbers. Besides these there was a superior kind of surgeon, called surgeon-of-the-long-robe, to distinguish him from the barber. These surgeons-of-the-long-robe were held inferior to physicians; nevertheless they prided themselves on their classical attainments and disdained to perform surgical operations. They gave advice to their patients and then called in the barber-surgeons to do the actual operations. By authority from legal enactments and royal edicts these surgeons-of-the-long-robe controlled the profession; in respect to them the barber-surgeons had a standing little better than menials. The surgeons-of-the-long-robe brought no originality to surgical knowledge; they discouraged any attempt at improvement and based all procedures on traditional methods. They handed on, and rigidly enforced, rules of treatment that had been followed slavishly for centuries.

What Paré did was to revolt against the overlordship of these surgeons-of-the-long-robe, to defy the dry tradition of ancient surgery, and to bring into the field the enlivening influence of actual observations and new methods based upon experience. He wrote books on surgery that opposed the cherished tradition of obsolete methods and, what was the most outrageous of all in the eyes of the surgeons-of-the-long-robe, he dared to write in French instead of Latin, that all might see and know. It is difficult now to comprehend fully the importance of Paré's work in breaking the hold of tradition, for we are no longer so impeded in the advancement of learning. In Paré's day orthodox surgery held ancient tradition in religious veneration, and any deviation from the old ways was in the nature of a heresy, for which a man might be tried and burned.

I want to tell you something now of the man himself, this iconoclast in the field of surgery. His experience was gained mostly in the battlefields of France. Those were days before Red Cross agreements to spare the wounded; after defeat the wounded were killed

by the enemy and so also were the prisoners who could not provide ransom. The only surgeons with the army were those whom the nobles took with them as their personal attendants. Sometimes these surgeons took care of the common soldiers, if they had the time and inclination, but more often these poor men were dependent upon the rough ministrations of their comrades, or those of the camp-followers, the women that trooped along with the army.

War distressed Paré as it does all sane men, and it distressed him the more because he saw it first hand. He wrote of his earliest experience on the battlefield at Turin, in 1536:

We thronged into the city and passed over the dead bodies and some that were not yet dead, hearing them cry under the feet of our horses, which made a great pity in my heart, and truly I repented that I had gone forth from Paris to see so pitiful a spectacle. Being in the city, I entered a stable, thinking to lodge my horse and that of my man, where I found four dead soldiers; and three who were propped against the wall, their faces wholly disfigured, and they neither saw, nor heard, nor spoke, and their clothes yet flamed from the gunpowder which had burned them. Beholding them with pity, there came an old soldier who asked me if there were any means of curing them. I told him, no. At once he approached them and cut their throats gently and without anger. Seeing this great cruelty, I said to him that he was an evil man. He answered me that he prayed God that when he should be in such a case, he might find some one who would do the same for him, to the end that he might not languish miserably.

The use of firearms was a new feature of warfare in those times. Cannons were used first at Crécy in 1346, but the arquebus, the forerunner of the musket, was introduced nearly a century later, and in Paré's time arrows and the crossbow were still part of the soldiers' armament. Gunshots brought complications into warfare and into surgery. The armor that had protected the nobleman against arrows was not sufficient against gunshot and was soon discarded. There was now also a new kind of wound to treat, and unfortunately the traditional teachings, dear to the surgeons-of-the-long-robe, provided no remedy for gunshot wounds. The nearest approach was the conception that bullet wounds were poisoned wounds and, therefore, to be cauterized by pouring boiling oil into them. Here is what Paré had to say on the point:

Now I was at that time a green soldier. I had not yet seen wounds made by gunshot, at the first dressing. . . . I wished to know how the other surgeons did, for this first dressing. It was to apply oil as hot as possible into the wound. I took courage to do as they did. At last my oil lacked, and I was constrained to apply in its place a soothing ointment. That night I could not sleep at my ease, fearing by lack of cauterization that I should find the wounded, on whom I had failed to put the oil, dead or poisoned, which made me rise very early to visit them, where, beyond my hope, I found those upon whom I had put the soothing ointment feeling little pain, their wounds without inflammation or swelling, having rested fairly well throughout the night; the others, to whom I had applied the boiling oil, I found feverish, with great pain and swelling about their wounds. Then I resolved with myself nevermore to burn thus cruelly poor men wounded with gunshot.

Cauterization with hot oil or molten pitch was used also to stop the hemorrhage of operation, such as amputations. The pain from the heat was intense, and, in consequence of the burns, the wounds healed very slowly. Paré discarded this practice in the face of intense opposition from the surgeons-of-the-long-robe. He tied the severed blood vessels with cords, a practice followed by modern surgeons. He reported one of the cases that he treated thus, at the siege of Danvillers: "My patient," he says, "returned home gaily, with a wooden leg, saying that he had got off cheaply without being miserably burned to staunch the bleeding."

Paré took pride in the accuracy of his diagnoses, and justly so. Let me quote some fragments from the case of Antoine de Bourbon of Navarre, who was the father of Henry IV, and whose wife, Catherine de' Medici is said to have poisoned. Paré, in speaking of events at the siege of Rouen in 1562, said: "The King of Navarre was wounded some days before the assault by a bullet-shot in the shoulder. I visited him and aided in dressing him, with his surgeon and others. They could not find the ball. I searched for it very exactly. I perceived by conjecture that it had entered by the head of the bone at the top of the arm and that it had run into the cavity of the bone, which was the cause that they could not find it." Paré maintained to Catherine de' Medici and King Charles IX, in stout defiance of the surgeons-of-the-long-robe who attended the Bourbon king, that he would die from his wound. The death occurred on

the eighteenth day, and Catherine desired to locate the bullet. Paré said: "That I was glad, and told them that I was well assured of finding it very soon; which I did in the presence of the surgeons and that of many gentlemen; it was just in the middle of the cavity of the bone." Few surgeons today could make that diagnosis without the use of X-rays.

I have made my contrast—three kings and two queens against one barber. They made the wars; he healed the wounded. Their names fill the pages of history, but we owe them no debt of gratitude; his finds small place in world history, but we owe him much. Perhaps his very humility deprives him of a place with these ruthless men and women. He took no credit for his healing powers. His oft repeated words concerning those whose wounds he treated were, "I dressed him, God cured him."

CHAPTER THIRTY-ONE

LORD LISTER



MODERN medical science has entirely altered our ways of living and thinking. It has produced a revolution in human habits more profound and more widely spread than any changes that have ever occurred from a political revolution. The amazing aspect of this quiet medical revolution is that it has occurred within the course of only a few years. It is very new, for it has come about from the discoveries in medical science made during the lifetime of men still living.

I wonder if you realize that one of the most fundamental changes in our habits and beliefs has come from the discovery that infection in wounds is due to germs or bacteria. It is only a little more than sixty years now since Dr. Joseph Lister first propounded that revolutionary principle. He was the first man to apply antiseptics to wounds in order to prevent or check infection. Before Lister did this there were no ways of controlling infection nor was there any knowledge of what infection is.

Lister's work was done in a hospital; he was interested in preventing infection in wounds that he saw there. He revolutionized surgery. But the principles he set forth went beyond the narrow confines of the hospital. They became a part of common knowledge. Your small son and daughter know more about the treatment of wounds and the transfer of infection than did Ambroise Paré or the most enlightened surgeons of only sixty years ago.

The bottle of antiseptic on the shelf of your bathroom cabinet is a memento of Lister's work. The sanitary barber shop, the clean restaurant, and the steam laundry all came into being as the result of it. The passing of the old-time roller towel and the common

drinking-cup at the public fountain marks the progress of the principles he set forth. From Lister's work we achieved a new conception of cleanliness and a tangible reason for cleanliness. The advent of cleanliness—cleanliness with the motive of preventing transfer of infection—is one of history's most revolutionary changes in human habits.

Now this change, as I said, started in a hospital, and in order to see its development I want you to go back with me for a few moments to its place of origin in the year 1860. We shall go to a hospital in Glasgow, Scotland, for I want you to meet a young surgeon there. While we are waiting for him we shall walk together through the wards, between the rows of beds. You can scarcely realize that this place is a hospital. The walls and ceilings are painted a dingy brown so that they will not show dirt and stains. The floor is wooden and it is covered with strips of carpet from which the dust arises at each step. In the far end of the room a slovenly old woman in a dirty, trailing skirt is sweeping with a broom and raising clouds of dust and lint as she collects a pile of discarded bandages. These beds beside us are wooden; the mattresses are stained and the linen is soiled.

Here comes a wound-dresser; watch him at his work. He is taking off the bandages from a poor fellow's leg. I think we shall turn our heads away for a moment. Never today anywhere have you seen a wound like that one; it is infected frightfully. But the sight of it does not seem to distress the dresser; all the wounds he has ever seen have become infected in the same way. The bandage is on again now. We can turn back and watch the dresser as he moves to the next bed, where there is a patient newly arrived. Not a very serious wound, this one; but it will be a day or two, for see what that dresser is doing. His hands are filthy from the last wound he attended. He has not washed them; neither does he wear rubber gloves. His dressing forceps rest on the soiled bandages taken from the previous patient. Now he draws from his pocket a sponge and wipes the wound—the same sponge with which he wiped the other. It seems incredible, but he is actually spreading infection. Surely if the surgeon were here he would intervene. But he does not. He has come into the room now and is standing there watching the dresser

move from bed to bed—hands still unwashed—bandages laid on the floor, to be picked from there and used.

This surgeon is a young man, an English Quaker. Joseph Lister is his name. Today, as often in these wards, he is sad. His melancholy shows in his fine and sensitive face. He passes from bed to bed, a kindly word to each occupant and a smile of sympathy for the poor fellows whose faces are flushed with fever, whose cheeks are hollow, and whose eyes are dull and heavy. These are sad cases. Serious operation, you ask? No, they are not serious from present-day standards. There is not a single case there of operation on the abdomen; no operations for appendicitis or upon any of the internal organs or joints. These are wounds, accidental injuries, and fractured limbs. In those days only a few men dared to do surgery in the abdomen, for in most of such cases the patients developed fever and died.

Some of these patients here have diseases that are no longer seen today—hospital gangrene and phagedæna; they are diseases that result from uncontrolled infection in wounds. Some of the patients will live. But it is a discouraging outlook for the young surgeon. He does his work well, but it seems a hopeless task. His operations are successful; his patients come to the ward in good condition, they do well for a day or two, but then the deadly fever sets in.

There are exceptions, and it is these exceptions that catch and hold Lister's attention. In a few beds in the ward there are men without fever. They have broken legs—simple fractures, and hence with no open wounds to dress, but merely splints to hold the legs in place. In a few weeks these men will be out on crutches, for the fever never touches them. That fact is a puzzling one to Lister; his teachers have taught him that infection and even putrefaction are normal and regular parts of the healing process. There are wounds in those broken legs, but they do not putrefy. All other wounds heal slowly, with fever, while these heal quickly, without fever. There are theories to account for this difference, but they are not good theories. One is that air which comes in contact with the open wounds poisons the flesh; another that there are present some undefined vapors in the air called "miasms" which arise in unhealthy and swampy regions and in crowded hospital wards, poison-

ing wounds and bringing on fever. Some men have even gone so far as to advise the tearing down of surgical hospitals as menaces to public health. But even this radical step would not help, for the wounded in their own homes have fever.

This fever we know now as blood-poisoning; today it is an unusual occurrence.

Now we are going to leave the young surgeon at the Glasgow hospital for a time. We are going to cross the channel into France. Pasteur, the chemist, is working there and has just completed a series of experiments which have brought to a definite end the long controversy as to whether life arises spontaneously or comes only from preëxisting life. This controversy has been one of long standing. The development of the microscope has revived it, for with this instrument there has been revealed an entirely new field of life. Bacteria, yeast cells, and other minute forms, invisible to the naked eye, can now be seen. These minute living organisms have been found in every nutritious fluid that chemists have examined. The great question is: Where have they come from? On that point scientists have been divided. Some have said that they are germs of life evolved from the chemical elements of the fluid in which they live. Pasteur, on the other hand, is stating that they come from the air, where they float about as dust; that they fall into the fluid and merely multiply there because it is nutritious. To prove his point he describes an experiment he has made.

He partially filled two flasks with nutritious fluid. Then he heated these flasks to destroy bacteria and yeast that might be present in the fluid. Next he stood the flasks on a table. One of them he left open, but the top of the other he covered with cloth and cotton. Germs and yeast soon appeared in the fluid in the open vessel and it putrefied; but none appeared in the fluid in the covered flask, which remained clean and sweet. Thus he showed that bacteria were not generated spontaneously, but came from the dust that fell into the open vessel. Pure science was advancing.

There the matter might have rested as one of only academic interest. But Pasteur himself was the first to see a practical application. He was asked to investigate the cause of "sickness" in wines. The great wine-growers of France were in difficulties, for the best

wines during preparation often became putrid and unfit for consumption. Instead of clear fluid with a pleasant bouquet, they obtained a thick fluid with an unpleasant odor. Pasteur quickly found the cause for this "disease" of wines. He showed that the putrefaction resulted from the growth and action of bacteria or germs which got into the wine from the air and from the sides of dirty containers. To prevent putrefaction he developed a process of treating the fluid with heat to kill the bacteria. This process has been known ever since by his name, "Pasteurization." It is the process now extensively employed in preventing infection from milk. Another great application of Pasteur's work is the canning of fruit, meat, and vegetables.

With these discoveries of Pasteur in mind, we return again to Glasgow and Joseph Lister. In the year 1864, one of his friends told him, as a matter of general interest, of Pasteur's work on putrefaction. Lister at once had the answer to the question which had puzzled him; why it was that simple fractures did not lead to fever. The infection in wounds was like putrefaction in wine; it resulted from the presence and action of germs. Open wounds, like the open flask in Pasteur's experiment, were exposed to the air and germs fell into them or were carried there by dirty instruments and soiled bandages. The wound in a simple fracture was not exposed to air nor were bandages brought in contact with it; consequently no germs got into it. It was like Pasteur's covered flask. Lister defined the application of Pasteur's work to surgery in these principles: First, germs must be prevented from getting into the wound during operation. Second, if they are already in the wound, the surgeon must kill them before they spread and obtain a foothold; further germs must then be prevented from entering the wound.

His next step was to try out this idea on a surgical case. He decided to start with a wound in which the germs were already present. A compound fracture seemed best suited for the experiment, for in his time the mortality from that type of injury, because of infection, was so extremely high that even if he failed of success, his experiment could hardly make the prospects of the patient worse than they already were. Forty to sixty per cent of the patients with this kind of fracture died from fever, anyway.

Lister's next problem was to find something with which to destroy the germs in the wound. Obviously, he could not use the heat treatment that Pasteur employed. Therefore he turned to chemical substances in the hope of finding one that would kill germs without seriously injuring the flesh. Curiously enough, at this time his attention was called to the use of carbolic acid in the treatment of sewage to prevent unpleasant odor from putrefaction. He obtained a sample of impure carbolic acid then sold under the name of German creosote.

His preparations were now all made, but he waited ten months for the arrival of a case in which he felt the use of his new treatment would be justified. When it finally came, he applied carbolic acid to the wound and built a tent-like structure over it to exclude the germs in the air. In spite of these precautions, the patient developed fever and died. But Lister persisted. He improved his method. He washed his instruments in carbolic acid; he dipped his hands in it; he sprayed a mist of carbolic acid into the air about the room; he applied elaborate dressings. Success followed. Thereafter not only were his patients free from fever, but Lister began to see something equally unusual. The wounds he treated healed by what surgeons call "first intention." Formerly they were held open to allow the discharge of putrid material. Such wounds heal very slowly and only as new flesh grows from the bottom upward to fill the gap. That is called healing by "second intention." Under Lister's new method of antisepsis there was no discharge from the wound, so that he could bring the sides of it together with stitches and the clean flesh could grow together directly—by first intention.

In those early days, Lister was convinced that the germs came mostly from the air, and so he worked in an operating-room into which a mist of carbolic acid was sprayed. In fact, so prominently did he stress the use of carbolic acid, that other surgeons in England and Scotland thought he was trying merely to introduce a new medicine and their attention was distracted from the fundamental principle which he was advocating. Consequently many were indifferent to his work and some even hostile towards it. But Lister was unperturbed by indifference and opposition, and went his calm and even way teaching his students the new method, performing

safely operations that other surgeons feared to do, and saving the lives of patients in his wards.

Reports of Lister's successes gradually spread to the Continent, and soon foreign surgeons visited him. They watched his work and they carried back to their own countries the knowledge of antiseptis. Finally tardy recognition came at home. In 1877, Lister was given the chair of surgery at King's College, London, and a larger field of work was opened to him. Slowly, very slowly, his ideas were taking root. The operating-room was gradually changing its appearance, and so also was the hospital ward.

Lister's idea that the germs came from the air gave place in time to the knowledge that they came instead from the filth ground into the accidental wound, from the hands and instruments of the surgeons, and from dirty bandages. Cleanliness—surgical cleanliness—then became the dominant idea. With its spread into everyday knowledge, cleanliness achieved a tangible purpose. Not only did *safe* surgery become a realized achievement, but the principle was carried into the home and into every place that men go. The human race became a cleaner race because Lister showed that uncleanness is the cause of infection.

Lister was made a baron in 1883—the first physician raised to the peerage. He retired from practice in 1896, but lived until 1912. He died two years too soon to see the greatest vindication of his principles of antiseptis carried out on the germ-ridden battlefields of France. There are thousands upon thousands of men who left those fields alive only because a few years before Lister had shown the cause of infection and blood-poisoning. There are many thousands more, wounded in peace times by accident or in operations, who owe their lives to Lister.

CHAPTER THIRTY-TWO

"DENTOLOGIA"



HERE was once a time, about four hundred years ago, when, if you needed your hair cut and your face shaved, you inquired the way to the nearest surgeon. When you got there you found over the door of his shop a wooden pole painted with red and white spiral stripes like a stick of candy. In the window there was a wide dish of polished brass with a semicircular space cut from one side of its rim. You entered and made your wants known. The surgeon motioned you into a chair and handed you the brass dish. You put it under your chin, with the semicircular opening fitting against your neck. After these preliminaries the surgeon cut your hair and shaved your face, using the dish as a mug in which to mix the lather and as a basin to catch the drippings. In those days the town barber and the leading surgeon of the community were one and the same person.

Let us see now what the dentist was like. Perhaps you had a toothache and wished to consult one—in those days you would have consulted one for no other reason. You have a wide choice to select from. Provided your taste and purse inclined that way, you could apply to the state executioner, who conducted dentistry as a side line. If not engaged in his major occupation he would gladly lay aside his rope and ax and gouge out the aching molar for you, with only a small fee in recompense for his services. The keeper of the public bathhouse was also an amateur in extraction. But for really expert treatment you would have applied to the mountebank who had his booth on a raised platform at the street corner.

Stop and watch this vagabond dentist for a moment. He is a shifty-eyed, dirty rogue. The lead plaque on the brim of his cavalier's

hat is stamped with the image of the patron saint of tooth-pullers. His patched leather jacket is strung over with teeth, mementoes of his professional activities. With one hand he steadies the head of a terror-stricken youth and with the other he makes wide gestures



A MOUNTEBANK DENTIST OF THE SIXTEENTH CENTURY

The mountebank's assistant is extracting a premature fee from the pouch of the patient. These vagabonds practiced dentistry as a sideline to roguery.

to the crowd below him. He tells them that his name is Kindheart and that he is the world's most renowned extractor of teeth—quick, painless, and never failing. On the faces below him there are two expressions: one of merriment, worn by those who are here merely to enjoy the exhibition; the other, one of serious doubt, worn by

those whose aching teeth make them possible victims. Without interrupting his patter, the mountebank reaches for his extracting instrument and fumbles with it in the mouth of the youth; there is a sharp yelp of pain and the tooth is displayed to the crowd. The spectators thin out perceptibly. Your own toothache is diminished noticeably. Perhaps it would be better to return to the barber-surgeon and let him attempt the extraction even though his hand is less experienced.

In his shop you are told to lie on the floor; and as you stretch out on the boards, he kneels, holding your head between his legs. The instrument that he uses is a pelican, a sort of forceps with ratchet teeth on its blades, suggestive of the pipe-wrench that is now used by plumbers. The pelican when applied to the tooth has a relentless grip; brute strength completes the extraction.

This barber-surgeon of four hundred years ago will, if you request it, do more than merely relieve the pain of toothache by extraction; he will repair the blemish to your appearance by filling in the gap in your teeth. He can whittle out an ivory peg and tie it in place with gold wire.

If you can afford it he will transplant a tooth. But for that operation you must first purchase a sound tooth from some one else. Your most likely prospect is a young girl or boy whose needy parents will sell their children's teeth. The sound tooth is extracted, its roots forced into your jaw, and its crown tied in place with thread. In a week or two the bone will grow firmly to the transplanted tooth. You now have the satisfaction of knowing that this new tooth of yours will never ache because its nerves have been severed. Of course it is infected and in time an abscess will form in the jaw-bone about it, but no one in that time knew anything about infection from teeth or its effect upon health.

If you ask this dentist what causes decay he will probably tell you that it results from worms that eat away the substance of the tooth just as they eat away the flesh of an apple. If you ask him how to prevent toothache he may hand on to you the ancient treatment recorded by Pliny, which was to eat a whole mouse twice a month.

The dentistry of four hundred years ago that I have pictured was, with minor variations, the dentistry of all previous ages; the

principles upon which its practices were based were carried down unchanged, nearly to the present century. The only considerations involved in this dentistry were the prevention of pain and the preservation of beauty; consequently, dentistry existed as a trade allied to those of the goldsmith and the beauty specialist. It is only in

The Incomparable Powder for cleansing the Teeth,
which has given so great Satisfaction to most of the Nobility and Gentry in England, for above these twenty Years, that it hath been publish'd, notwithstanding the many Counterfeits since its first Publication, endeavouring to imitate this, the only true original Powder. Sold only at Mr. Palmer's Fan-Shop (late Mr. Halseys a Bookseller) in St. Michael's Church-Porch, Cornhill, Mr. Markham's Toyshop, at the Seven-Stars under St. Dunstan's Church in Fleet-Street, and no where else in England. It at once using makes the Teeth as white as Ivory, tho' never so black or yellow; and effectually preserves them from rotting or decaying, continuing them sound to exceeding old Age. It wonderfully cures the Scurvy in the Gums, prevents Rheum or Defluxion, kills Worms at the Root of the Teeth, and thereby hinders the Tooth-ach. It admirably flattens loose Teeth, being a neat cleanly Medicine, of a pleasant and grateful Scent. Price 1s. the Box.

Note, All the Nobility, Gentry, &c. who send to Mr. Markham's for the Powder for Teeth, are desir'd to give strict Orders not to mistake the Shop, (MARKHAM at length is under the Seven-Stars) because most of the Toyshops in his Neighbourhood, seeing Multitudes come to his Shop for it, have trump'd up Counterfeits, and sell their Stuff in Imitation of our known and approv'd Powder, in Prejudice to the Publick.

N. B. At the same Places are sold the highly esteem'd Lip-Salve for Ladies, &c. of a charming and delightful Scent. Price 1s. each Box.

L O N D O N.

A POWDER TO KILL THE WORMS IN THE TEETH

An advertisement appearing in the *British Journal* for 1724. The idea that tooth-ache is due to worms in the roots of the teeth is very ancient. An old method designed to remove them consisted of heating onion seeds in a small funnel, the stem of which was held against the aching tooth. Tiny worms, presumably from the tooth, but in reality driven out of the onion seeds, were found in the funnel after it had cooled.

modern times that we have come to realize that the primary consideration in dentistry should be the prevention of disease and the preservation of health. The dentist of today has become the practitioner of a great and important specialty of medicine. And it is only fair to add that the surgeon has given up his barber's duties.

In following the progress of dentistry I am going to tell next of a dentist of two hundred years ago. We shall visit a Frenchman by

the name of Pierre Fauchard. Dentistry is not yet a profession, but has been taken from the hands of the vagabond and the mountebank. It is practiced as a recognized and respectable trade. The objects of dentistry have not changed, however; they are still merely the prevention of pain and the preservation of beauty. We shall stand for a time in Fauchard's room and watch him treat his patients. The first one to enter is a young lady, the daughter of Monsieur Tribuot, organ-builder to His Majesty Louis XV. She is suffering agonizing pain from a decayed tooth in her upper jaw, but she cannot make up her mind to have it out because of the disfigurement that will result. She appeals to Fauchard and he suggests a happy solution to her difficulty. Carefully and skillfully he extracts the tooth. Then he puts it back, driving its roots into their former socket. He ties the tooth in place with thread, fills its gaping cavity with lead.

The extraction has broken the nerves that supply the tooth and so the pain will stop. The jaw-bone will grow about the tooth and hold it in place; the lady's beauty will be saved. But Mademoiselle Tribuot will have her troubles later. The operation that Fauchard has carried out for her is essentially the same as pulling an infected splinter out of the flesh and then inserting it again. The lady will soon have an abscess in her jaw-bone; perhaps rheumatism will follow, and her stiffened fingers will lose their skill on the keys of the organs that her father builds. But in the meantime she will retain her beauty—at least until she has married. Only a few years before, Fauchard straightened the crooked teeth of one of her friends, Mademoiselle Gasset, and her parents made an excellent match for her—she is now rich and unhappy.

When Fauchard filled the cavity in the tooth he had no dental engine with which to drill; he used a file instead. John Greenwood, dentist to George Washington, is said to have devised one in connection with a spinning-wheel, but it was not until 1870 that a practical form of the dental engine came into use.

Fauchard's next patient is an aged courtier whose only remaining teeth are those in the front of his jaws; for many years he has not opened his mouth to smile. Even these teeth Fauchard finds have become so loose that they must be pulled. The courtier will go into

seclusion while Fauchard makes false teeth for him. These he carves from ivory and fastens the pair together with springs. They resemble the famous set that George Washington used and which were repaired for him by Paul Revere, for Paul Revere was not only a silversmith and patriot, but also a dentist. Fauchard will, if you



TEETH PULLED WITHOUT EFFORT

A caricature of the eighteenth century showing an itinerate tooth-puller plying his trade on an outdoor platform. The struggle of the assistant, who is attempting to hold the patient on the seat, belies the dentist's slogan, "without effort."

wish, insert a pivot tooth; to do so he suspends the carved ivory crown on a wooden peg driven into the old fang. These ivory teeth were horribly insanitary, for they absorbed fluids from the mouth and could not be kept clean; they also decayed. It was not until

the nineteenth century that really satisfactory porcelain teeth were successfully manufactured.

For our next scene we shall go forward a hundred years from Fauchard's time. There are still no schools of dentistry; the students learned their trade by apprenticeship to older dentists. But the dignity of the trade has increased greatly and there is active coöperation between its members. To serve their common interests they have founded a journal of dentistry. Its first volume was published in 1839, in New York City; it was called the *American Journal of Dental Science*. In glancing through the pages of that first volume the item that catches the attention particularly is a poem in five cantos called "Dentologia, or a poem on the disease of the teeth," by Solomon Brown, A. M., "with notes, practical, historical, illustrative and explanatory," by Eleazar Parmly, dentist. This poem has an important place in dental history, for it marks the first serious attempt to popularize dentistry by pointing out the importance of conserving the teeth. This education of the public by the dentists has continued from that day onward; it is an important aspect of the services which they have rendered.

When this poem was written only a few people went to the dentist, and mostly they were driven there by pain. The poem, "Dentologia," was intended to emphasize the importance of dental care, but as they will see the appeal was not to protect health, but to prevent pain and to preserve personal beauty. The style of writing was that which was popular at the time. Here are a few lines from the second canto:

Robbed by neglect, of symmetry and grace:
Behold those organs formed on nature's plan,
To serve important purposes to man;
To form the sounds in which his thoughts are drest,
His wishes uttered, and his love confest;
To fit his solid food of every name,
For healthy action on the general frame;
Behold these organs, wrested by abuse,
From wisest purpose, and from noblest use,
Deranged, displaced, distorted, set awry,
Disgusting objects of deformity!

But learn the remedy—the dentist's skill
Subjects disordered nature to his will.

In a later canto the author devotes four stanzas to describing the alluring beauty of a lady named Urilla, "nature's favored child"; and then Urilla opens her mouth to speak:

And lo, the heavenly spell forever broke;
The fancied angel vanished into air,
And left unfortunate Urilla there:
For when her parted lips disclosed to view,
Those ruined arches, veiled in ebon hue,
Where love had sought to feast the ravished sight
On orient gems reflecting snowy light,
Hope, disappointed, silently retired,
Disgust triumphant came, and love expired!

Soon after 1839, schools of dentistry were opened and the technical aspects of the profession progressed amazingly. In the decade following 1880, mechanical dentistry reached its culmination in the vogue for ingenious and expensive crown and bridge work. But throughout this stage of development the primary object of dentistry had remained the same—the prevention of pain and the preservation of beauty.

Then, within the space of only a few years, there came a change, the beginning of a revolution in dentistry as profound as that produced in surgery by the work of Lister. Lister showed that infection in surgical wounds is caused by bacteria. His work laid the foundation for modern surgery and raised the profession to the position of dignity that it holds today. Dentistry likewise had its Lister. Professor Miller, an American dentist teaching in Berlin, made the discovery that decay of the teeth is due to the action of bacteria. He showed further that if this decay of the teeth is unchecked it may, and often does, lead to serious disease of the body. His work demonstrated clearly that the primary purpose of dentistry is to prevent disease and to preserve health. As a result dentistry has ceased to be merely a trade; it has become a profession. Today it is one of the most important parts of medical science. Its contributions to personal health probably rank higher than those of any other branch of medicine.

The discovery of X-rays in 1895 gave a great impetus to the spread of the knowledge of tooth infection. By means of the X-ray the

abscesses at the roots of the teeth and in the jaw-bone can actually be seen. The infected teeth can then be extracted and the dangers of general infection of the body, and consequent ill health, prevented. The purpose of dentistry, however, has extended far beyond this treatment of infection; it aims now to prevent infection.



WHEN SURGEONS WERE DENTISTS

A wood-cut of 1530 showing a barber surgeon extracting a tooth with an enormous pair of forceps. Usually at this time a pelican or a key was used. Extracting-keys were commonly used in the Colonial days of this country and are occasionally seen among collections of antiques.

Modern knowledge has demonstrated the steps by which the infection progresses. Each tooth has a layer of protecting enamel on its surface. Beneath the enamel, and forming most of the bulk of the tooth, is a hard substance called dentine. In the center of each tooth is a space filled with delicate tissue containing blood-vessels and nerves which extend from the jaw-bone and enter the tooth

through openings in its roots. This sensitive tissue in the center of the tooth is called pulp; through minute canals it extends out into the dentine. Decay of the tooth starts with a break in the enamel. The bacteria get into the dentine through this opening; they gradually destroy it, forming a cavity. The tooth is a living structure and this cavity in the dentine is an open and infected wound. Teeth do not repair their wounds.

The infection of the dentine is not serious until it has extended to the pulp in the center of the tooth. Prior to that stage it can be stopped and remedied by dental treatment and filling. If, however, the decay is allowed to extend to the pulp, and it will do so unless it is quickly arrested, the situation becomes serious. Nerves and blood-vessels are exposed; the tooth aches. Either extraction and subsequent bridge work are necessary, or else elaborate and expensive dental treatment is required to prevent the infection from reaching the jaw-bone.

Decay of the teeth cannot today be entirely prevented, even with the best care. Consequently, dentistry aims to arrest this decay at the surface and to prevent it from extending to the pulp of the tooth. Frequent examinations of the teeth are necessary to detect decay in its early stages. As a result the members of the dental profession have, in the interest of their patients, made every attempt to inform the public of the necessity of regular inspection of the teeth. But unfortunately, it is a proven fact that even the most skillful dentists are often unable to detect small cavities hidden away on those surfaces of the teeth which touch each other—the so-called interproximal surfaces. In spite of frequent examinations, decay in these localities may sometimes progress to an extent that necessitates expensive dental treatment.

Recently, however, the dentists have shown that these cavities can be detected even in the earliest stage by X-ray examination. The procedure of X-raying the teeth and their roots which was designed primarily to detect abscesses is not necessary in locating these interproximal cavities. It is sufficient merely to X-ray the crowns of the teeth.

Perhaps the greatest service that modern dentistry is rendering the public is education in the need of periodic inspection and ex-

amination as preventive measures against serious decay and infection. It has been only a few years since the patient visited the dentist only after a tooth ached. Now, a toothache signifies grave neglect. The dentists insist that we pay our visits with sufficient



A LONDON NIGHT SCENE

A copper engraving by Hogarth, 1738. The barber, his shop illuminated with candles, not only shaves, but also bleeds his patients and extracts teeth, as is indicated by his sign.

The second story of the building is evidently used as a residence.

frequency to allow the detection of decay in its early and easily reparable stages. Most dentists, and quite ethically so, request their patients to make definite appointments for annual or semiannual inspection. For some reason, perhaps because cause and effect between decay, pain, and loss of teeth is obvious, preventive dentistry

of this type has been widely accepted; the public is willing to co-operate with the dentist. Such is not the case in personal prevention of disease in the field of general medicine. Yet for the preservation of health and the prolongation of life the medical examination of the whole body is as important as the examination of the teeth for the prevention of decay. But physicians hesitate, for no reason that I know of, to request their patients in health to report periodically for physical examinations directed toward detecting incipient diseases. It would appear to me that much would be gained if physicians followed in the footsteps of the dentists and educated their patients to the need for periodic medical examinations.

Part Seven

THE NEWER MEDICINE

CHAPTER THIRTY-THREE

THE CANCER QUESTION



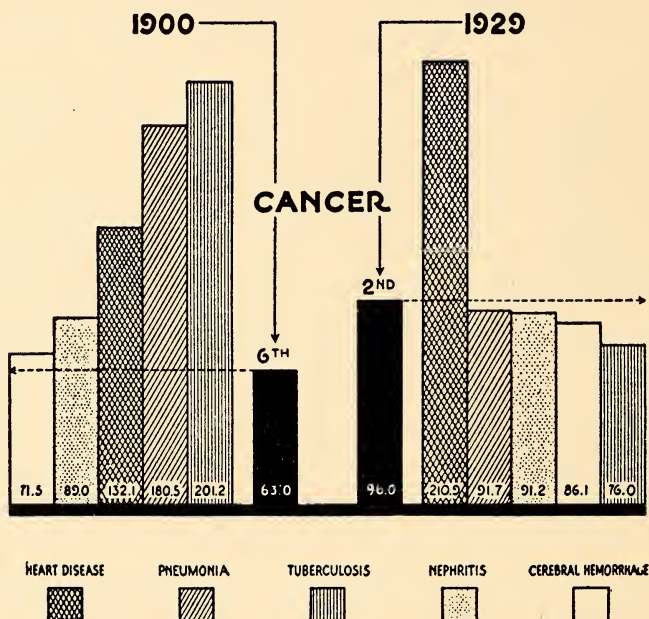
HAVE very strong views concerning publicity on medical matters; I believe that there should be as little as possible general discussion and description of the symptoms of disease. Such matters have a certain morbid fascination for some people, arousing needless fears and worries. In some cases their minds are so wrought upon by the gruesome descriptions that they develop imaginary maladies. It is difficult at times to communicate medical information without engendering alarm in hypersusceptible people that may result not only in worry but also in visitation to quacks and charlatans who are only too willing to agree with homemade diagnoses of non-existing disease, and to reap reward by pretending to effect its cure.

Strong as my prejudices are against the discussion of symptoms of disease I discard them entirely when I come to the question of cancer.

My reason is this: under the existing state of medical knowledge early detection of cancer is essential for its control. This detection can only be effected through the operation of two procedures—vigilance on the part of the individual, supplemented by annual medical examination at the hands of a physician. To this end it is necessary that people shall know the nature of the earliest symptoms that point to the possible presence of cancer. When such symptoms appear they should have immediate recourse to the physician. If this procedure is followed, many lives will be saved. But alone it is not sufficient. The symptoms arising from cancer of some of the internal organs most commonly affected are vague and are difficult to recognize at first. Consequently even in the absence of any

suggestive symptoms there is needed an annual physical examination by a physician who employs X-rays to inspect these organs.

This measure, the periodic examination in time of health, is an outstanding feature of the newer medicine, the personal preventive medicine that aims to detect disease in its early stages and to



DEATHS PER 100,000 POPULATION UNITED STATES REGISTRATION AREA

CANCER RANKS SECOND AS A CAUSE OF DEATH

From a chart compiled by the American Society for the Control of Cancer.

avert or arrest it rather than to attempt to cope with it after it has developed fully. The situation in regard to cancer offers one of the most obvious examples of the advantage to be gained from the practice of this type of preventive medicine, for detected in its early stages cancer frequently can be eradicated completely; in its late stages it cannot. The difference is often that between life and death.

Now just how serious is the cancer problem in this country today?

As shown by statistics obtained in 1929, cancer ranked second as a principal cause of death. In the United States more than 120,000 people die each year from the disease; one death in every ten is due to cancer. It is estimated that one man or woman in every seven over thirty years of age will have cancer. Each year the rate is climbing steadily upward. The situation is serious, but it can be made much less so by utilizing the means of control that are already available.

Now what is cancer? Millions of dollars are spent each year in studies carried out in medical laboratories throughout the world in an attempt to answer that question. But today the cause of the disease is not known. Nevertheless much practical and important information has been gained.

Cancer arises from a disturbance in the growth of the cells of which the body is composed. Each one of these microscopic particles which make up the flesh is a living entity, capable of dividing and producing new cells of its own kind for growth or repair. Under the influence of some controlling forces, concerning which little is known, growth is finally brought to a stop so that the cells of the adult body cease to multiply except for necessary repairs to the tissues.

Occasionally, however, the cells in some locality escape to some extent from this controlling force and grow excessively, producing a swelling. Such an overgrowth is called a tumor. The majority of such growths, like warts, do not escape entirely from the forces regulating growth; and the growth shows no tendency to spread into surrounding tissues. Such tumors have sharply defined boundaries. They are called benign; they can generally be removed completely. They are not cancers.

On the other hand, the cells that overgrow sometimes so entirely escape from the controlling forces that they become ungovernable; a cell anarchy results. A growth is produced which becomes an uncontrolled parasite upon the rest of the body. Such a swelling does not have sharp boundaries; it tends to spread into surrounding tissues and destroy them. This kind of growth is called a cancer.

Moreover, most kinds of cancer, when they grow large, tend to break up so that small particles escape into the fluids of the tissues. These particles are carried away and deposited in distant parts of

the body. New cancers are established. But always the fact is to be borne in mind that the cancer at the beginning of its growth is limited to one small area. Although it may develop rapidly, it can in its earliest state be removed completely, and the spread to the other parts of the body is prevented. But to attain this desirable condition it is first necessary to detect the cancer.

Now I have said that the fundamental cause underlying the abnormal growth of cells, the formation of cancer, is unknown, but nevertheless one important fact pertaining to it has been found out. Cancer in most instances arises at a point subject to some kind of chronic irritation and inflammation. The irritation is believed to be the exciting factor in stirring up the cells to ungoverned growth. One of the first observations of this kind was made on the members of a native tribe of India. Many of the men and women were subject to cancer which started in a most unusual place, the skin on the surface of the abdomen. Further investigations showed that these people had a custom of warming themselves by strapping to their bodies little metal boxes filled with burning charcoal. The continual slight burning caused a chronic inflammation. Prolonged irritation finally started cancerous growth.

You would hardly expect to find a similar custom among the people of our country, but nevertheless there is one analogous to it, one which in the past, at least, has been responsible for many cases of cancer. You have seen old men who smoke short-stemmed clay pipes. The heat from the pipe irritates the lip. Most of such men continue their habit with impunity as far as cancer is concerned, but others do not escape. Let us take the experience of one. He notices first that his lip has cracked just at the point where he habitually holds his pipe. If we look at this place with a microscope, we see that there is nothing more serious there than a split in the tissues, like a cut.

Perhaps for a few days the old gentleman carries his pipe on the other side of his mouth, but soon it returns to the old position and again the lip cracks. This time the sore is not painful, but it takes longer to heal; in fact it may remain open for many months. If now we examine the area with a microscope, we find that it shows signs of chronic inflammation; its margins are red and swollen. The cells

of the tissue which lines the lips have in their vain effort to bridge the gap grown thickly about the margins, making a slight swelling there.

Even now if the smoker discards his pipe, the sore with careful attention may heal safely. But human nature is perverse. It is only a small sore; it doesn't hurt, so why worry about it?

A few months later we see him again; the sore on his lip is hard and has a tendency to bleed. The cells have at last been stirred into action. They have begun to grow. They are spreading out of their normal position and are extending into the deeper tissues. They have escaped from the forces which govern growth. They are cancer cells. Their progress from now on will be rapid.

But fortunately this is their early stage, and so we can tell the man that if he will allow the surgeon to remove the tissue into which the new cells have grown, and to use such measures as radium and X-rays, as judgment dictates, the condition will with every probability be completely arrested. If he is an intelligent man with some knowledge of cancer, he follows that advice. But not all men have wisdom and knowledge, and so perhaps he goes away untreated.

Whether or not he smokes his pipe any more, we soon see him again. A few months later we find that his sore has become larger, and also that under the skin of his neck there is a small, painless lump. His cancer has spread. Surgery, radium, and X-rays now may possibly prevent further extension and imminent death. But this operation is not the simple one of removing a small area on his lip; every gland that can be found in a large area must be removed also. And we cannot give him very satisfactory assurance that his condition will be stopped. He has waited too long for safety.

Irritation leading to cancer may occur from many sources other than the heat from the short-stemmed clay pipe that I have used for my illustration. Cancer of the tongue, cheeks, and mouth is known to arise from the scratching and inflammation caused by jagged teeth or those that are out of line. Add to these sources of irritation that which is caused by the excessive use of tobacco and you have the explanation for the rise of most of the cancers

in these localities. Fortunately they are causes which can be prevented by dental care and the avoidance of the excessive smoking.

Furthermore dental inspection at frequent intervals allows the early detection of the small, painless ulcers which are the first indication of cancer of the mouth.

Like those of the mouth and lips, cancer on the skin may usually be detected in its early stages. Any sore that does not heal quickly should receive immediate medical examination. Especial attention should be paid to moles; these areas are sometimes the starting-points of cancers; moreover, being raised, they are subject to pressure or frequent slight injury. A mole should always be treated with respect; if its removal seems desirable, home remedies and the ministrations of a beauty-specialist are to be avoided and the matter intrusted only to the hands of a competent physician.

Unfortunately, cancer in localities other than on the skin or in the mouth is less easy to detect in its early stages. Thus cancer of the breast, a common form among women, does not usually start as a sore, but as a small painless lump. Less often it is indicated by a discharge. Either symptom demands immediate medical attention. Nor is the irritation which excites it obvious; neither bearing nor nursing children appear to be predisposing factors. In fact, the condition occurs more commonly among women who have not nursed children than among those who have.

Cancer of the uterus, on the other hand, is found more often among women who have borne children. It is believed that the predisposing irritation is due most commonly to slight injuries caused by childbirth, which have not healed. Many such cases could be prevented by scrupulous care and inspection of all injuries persisting after birth.

Cancer of the stomach is one of the most common forms of the disease, and, because of its hidden locality, difficult to detect in its early stages. One of its first symptoms may be persistent indigestion. But of course indigestion may arise from many causes other than cancer. The only safe procedure is to find out, follow the advice of "look and see," not "wait and see." Fortunately there is a way of looking. The test meal with X-ray pictures of the stomach and intestines gives the desired information. If this valuable procedure

were followed, as it should be, as a routine measure in the annual physical examination, many cases of cancer of the stomach would be found in the very early stages when treatment is effective; many lives would be saved.

I have stressed the importance of chronic irritation and chronic inflammation as exciting factors in the development of cancer. I have done so because prevention of such irritation seems the only method at present available for prevention of cancer—beyond that the only hope of controlling the situation lies in early detection of existing cancer.

But still there remain many questions unanswered. Why does irritation in some parts of the body fail to produce cancer? Irritation of the little toe from tight shoes is common, but cancer in that locality is not; chronic inflammation of the nasal passages is very frequent, but cancer is uncommon in that region. Obviously certain parts of the body become cancerous more readily than others. And what is more, some people are apparently more susceptible than others.

That fact brings us to the question of heredity in relation to cancer. It has never been proved that a person can directly inherit cancer, but the disease does seem to occur more frequently in some families than in others. Perhaps that is just chance. But experiments on animals, for they also have cancers, indicate that the susceptibility to cancer formation from irritation may be a hereditary factor. But certainly no one can speak positively in the matter concerning human beings.

One, however, can speak positively on the subject of the contagion of cancer. There is not the slightest bit of evidence to support the belief that the disease is infectious. One can say positively that it is not. Nor is there any reason to believe that cancer in man is caused by a germ or a parasite.

There is one popular belief that has done much to increase the mortality from cancer. Somehow the idea has arisen that cancer is a disease to be hidden, something to be mentioned only among the members of the family and in a hushed voice. Nothing is more absurd than the idea that cancer is a cause for shame. Such a belief probably dates back to those superstitious days when cancer was

looked upon as a punishment for sins, when cancer of the tongue was supposed to result from speaking blasphemy. Cancer is a misfortune, not a sin.

The unfortunate custom of hiding the condition has resulted in a vast number of deaths because it has kept the sufferers from going to their physicians at the first suggestive symptom, and has driven others to quacks and charlatans who raise false hopes by promising "cures." The loss of money paid to such men is much less serious than the loss of time. Even in the few months during which they try their "cures," the cancer passes from the condition in which it could be controlled into the inoperable and hopeless stage.

You perhaps think that the early symptoms of cancer as I have described them are rather vague, and so they are: any lump, any sore that does not heal quickly, any unusual discharge or bleeding, and continual indigestion. Moreover, in its early stages the disease is painless. You might feel hesitant about going to a physician with such slight disturbances. If you do, you have little knowledge of cancer. The slightest symptom is worthy of investigation, and even though your physician assures you that it has no serious significance the information is desirable. Sometimes the significance is serious. Why not be on the safe side? Let your physician be the judge.

All of us, I know, hope fervently for some great medical discovery that will show the means for curing or preventing all cancer. But it may be centuries before that discovery is made, if it ever is. In the meantime, one out of every ten deaths is from cancer, while right before us are the means of preventing a great many of these deaths. There are thousands of people in the United States today who have had cancer which has been detected in its early stages and removed; they are today, fifteen, twenty years afterward, in excellent health, with no sign of return of the disease.

Today the control of cancer depends upon continual personal vigilance combined with X-ray examinations at the hands of a physician in the annual health audit. If these measures of personal preventive medicine are practiced, cancer is not a hopeless disease.

CHAPTER THIRTY-FOUR

EXPLORING THE STOMACH



THREE apparently incongruous events—a young man leaving his New England home to seek his fortune; an obscure French-Canadian, shot and wounded at a frontier trading-post; and world-wide recognition and honor to an army surgeon—these are the ingredients in the strange story of America's first great contributor to physiology and one which indirectly

led to the means of detecting cancer in the stomach.

For the first of these events we start with the year 1806 at the town of Lebanon, Connecticut. There, on a winter day, a young man named William Beaumont left his father's house and set out to seek his fortune. He carried with him the possessions accumulated in the twenty-two years of his life—a horse and sled, a barrel of cider, and one hundred dollars. That winter he traveled through the western part of Massachusetts and Vermont; in the spring he came to the village of Champlain in the State of New York, where he obtained the position of schoolmaster. In his spare time he read such medical works as were available in the town. This pursuit so aroused his interest in the subject that in 1810 he removed to St. Albans, Vermont, in order to study more deeply in medicine with the assistance of a Dr. Chandler. When the War of 1812 broke out, he obtained the position of assistant surgeon in the United States army.

The next event occurred ten years later in the northern wilds, on an island in those waters where Lake Michigan and Lake Huron unite. On this island stands Fort Mackinac, long the center of Indian wars, but now, in the year 1822, garrisoned with troops to protect a trading-post, one of the headquarters of the American Fur

Company. Let me tell of the occurrences there in the words that Sir William Osler used to describe them. He says:

On a bright spring morning the village presented an animated scene. The annual return tide to the trading-post was in full course and the beach was thronged with canoes and batteaux laden with pelts of the winter's hunt. Voyageurs and Indians, men, women, children, with here and there a few soldiers, made up a motley crowd. Suddenly from the company's store there is a loud report of a gun, and amid the confusion and excitement the rumor spreads of an accident, and there is a hurrying of messengers to the barracks for a doctor. In a few minutes an alert-looking young man in the uniform of an army surgeon made his way through the crowd and was at the side of a young French-Canadian who had been wounded by the discharge of a gun, and with the composure bred of an exceptional experience of such injuries, prepared to make the examination. Though youthful in appearance, Surgeon Beaumont had seen much service; at the capture of York and at the investment of Plattsburg he had shown a coolness and bravery under fire which had won high praise from his superior officers. The man and the opportunity had met. . . .

The last event in the three that I am relating occurred a little more than a century later. In the summer of 1929 there was held in Boston the eighth International Congress of Physiology. World-famous scientists from every quarter of the globe gathered together there to exchange ideas on physiology. This was the first time that the congress had been held in America. According to custom each congress is dedicated to a famous physiologist and a medal is struck in his commemoration. That of 1929 paid this honor to the pioneer of American physiology—the army surgeon, William Beaumont.

Each member attending the congress received, besides the medal, a reproduction of Beaumont's famous book, published at Plattsburg, New York, in 1833, and called *Experiments and Observations on the Gastric Juice and the Physiology of Digestion*.

The greater part of modern knowledge of digestion in the stomach is based on the facts presented in that book. It describes the character of the digestive secretions of the stomach, the rate of their formation, and the nature of their action. It tells of the adverse influence of worry and mental disturbance upon the process, and the injurious effects upon the stomach of tea, coffee, and alcohol when taken in excess. It describes the motion of the stomach during di-

gestion and also the rate at which different kinds of material are emptied from that organ. It includes also a study of the digestibility of different articles of food in the stomach—one of the most important practical contributions ever made to the subject of diet.

EXPERIMENTS, &c.

FIRST SERIES

Experiment 1.

August 1, 1825. At 12 o'clock, M., I introduced through the perforation, into the stomach, the following articles of diet, suspended by a silk string, and fastened at proper distances, so as to pass in without pain—viz. :—a piece of high seasoned *a la mode* beef; a piece of raw, salted, fat pork; a piece of raw, salted, lean beef; a piece of boiled, salted beef; a piece of stale bread; and a bunch of raw, sliced cabbage; each piece weighing about two drachms; the lad continuing his usual employment about the house.

At 1 o'clock, P. M., withdrew and examined them—found the cabbage and bread about half digested: the pieces of meat unchanged. Returned them into the stomach.

At 2 o'clock, P. M., withdrew them again—found the cabbage, bread, pork, and boiled beef, all cleanly digested,† and gone from the string; the other pieces of

AN EXPERIMENT ON A HUMAN STOMACH

A page from Dr. Beaumont's famous book published in 1833, reporting his experiments on Alexis St. Martin.

The facts that Beaumont presented have been amplified and details have been added during the century that has passed since his work was done, but none of his statements has ever been disproven and there is no probability that any ever will be, for they were based on observations made by actually looking into the stomach and watching it while it performed its functions. The stomach upon

which these unique observations were made was that of the young French-Canadian, shot at the trading-post at Fort Mackinac.

An eye witness of the shooting has left us this version of it:

Alexis St. Martin, the French-Canadian, was standing in the company's store where one of the party was holding a shotgun (not a musket) which was accidentally discharged, the whole charge entering St. Martin's body. The muzzle was not over three feet from him—I think not more than two. The wadding entered, as well as pieces of clothing; his shirt took fire; he fell, as we supposed, dead.

Dr. Beaumont, the surgeon of the fort, was immediately sent for and reached the wounded man in a very short time, probably three minutes. We had just gotten him on a cot and were taking off some of his clothes. After the doctor had extracted part of the shot, together with pieces of clothing, and had dressed his wound carefully, he left him, remarking: "The man cannot live thirty-six hours; I shall come to see him by and by." In two or three hours he visited him again, expressing surprise at finding him doing better than he had anticipated. The next day, after getting out more shot and clothing, and cutting off ragged edges of the wound, he informed Mr. Stewart, in my presence, that he thought he could recover.

During the next ten months Dr. Beaumont treated the destitute St. Martin. At the end of that time the civil authorities of the island declared the patient a "common pauper," declined to provide further for him, and stated their intention of having him transported in a canoe to his home in Canada, fifteen hundred miles away. Dr. Beaumont protested against this step, for he realized that his patient would not survive the hardships of the journey. When he found the civil authorities obdurate, he resolved to care for St. Martin at his own expense—a charity that was repaid by unique observations that brought everlasting fame.

Here are Dr. Beaumont's own words, taken from a report to Congress in which he described the situation. He writes:

St. Martin was, at this time, altogether helpless and suffering under the debilitating effects of his wounds—naked and destitute of everything. In this situation your memorialist received, kept, nursed, medically and surgically treated him and sustained him, at much inconvenience and expense, for nearly two years, dressing his wounds daily, and for a considerable part of the time twice a day, nursed him, fed him, lodged him and furnished him with such necessities and comforts as his condition and suffering required.

At the end of the two years he had become able to walk and help himself a little, though unable to provide his own necessities. In this situation your

memorialist retained St. Martin in his family for the special purpose of making physiological experiments.

After nearly three years of treatment St. Martin's enormous wound had healed except for a small opening leading into his stomach. All of the efforts of Dr. Beaumont to make this last portion close over were unsuccessful. A fold of flesh covered the opening; when this was pushed aside the interior of the stomach was exposed to view.

During August and September of 1825, Dr. Beaumont made his first experiments on St. Martin: he studied the rate of digestion of various kinds of food by inserting them into the stomach and noting the rate at which they disintegrated; he also collected and examined the secretion of the stomach and observed the movements and appearance of that organ during digestion.

In September St. Martin deserted Dr. Beaumont. He had now recovered his health sufficiently to undertake the arduous trip to Canada. He remained there four years, working as a voyageur; he married and had two children. In 1829 Beaumont learned of his whereabouts, and with the aid of the American Fur Company finally succeeded in employing him to continue the experiments. St. Martin, with his wife and children, came two thousand miles to Fort Crawford on the upper Mississippi where Beaumont was stationed. The experiments were commenced, and continued for two years. Again St. Martin returned to Canada. Twice thereafter the two men met, but only for short periods. St. Martin had obtained a small farm in St. Thomas, Canada, and refused to leave even when offered a large sum to go to England for examination. His health remained excellent and he lived to be eighty-three years of age.

Dr. Beaumont published his book of observation in 1833 and, as I said, laid the foundation to all modern studies of digestion in the stomach. Six years later he resigned from the army service and entered private practice at St. Louis, where he died in 1853.

From Beaumont's observations medical science profited enormously through the knowledge that was obtained of the digestion of different foods and the effects of improper diet upon the stomach. But however helpful these matters were in regard to general prin-

ciples of diet, they did not aid the physician in determining the presence or nature of disease in the stomach of the individual patient under examination. Fortunately or unfortunately—whichever way you care to look at it—stomachs are not all open to inspection as was that of Alexis St. Martin.

Since a physician could not see into the stomach of the patient, he was forced to form opinions concerning the nature of disease from outward symptoms. Direct inspection would have been so much more reliable a method of diagnosis, particularly for such conditions as cancer, for which early and precise diagnosis is of extreme importance to health and life. But in the time of Beaumont the idea that the physician would one day be able to see the stomach of every patient was beyond wildest dreams. Yet in 1897 a way was devised for observing the movements of the stomach and also for obtaining a photographic record of its outline.

This direct inspection of the stomach came as a development from the discovery of the X-ray in 1895. Such rays pass through the substance of the body much as sunlight passes through glass. But they do not pass through all of the structures of the body with equal ease; bone and other dense tissues obstruct their passage more than does muscle or fat.

The stomach, as it so happens, is no more dense in substance than are the structures which surround it, so that no striking contrast is afforded. Consequently, under ordinary conditions it fails to show in sharply defined outline on the X-ray film. A way around this difficulty was found, however, for in 1897—two years after Roentgen's discovery of the X-ray—Professor Walter Cannon of Harvard, then a medical student, brought forward an ingenious method for making the stomach visible with X-rays.

His work was done in the course of experiments performed to study the normal movements of the stomach, and were carried out on animals. He found that bismuth powder was opaque to X-rays. Bismuth powder is an inert and harmless substance that has no more action on the stomach than has talcum powder on the skin. He mixed some of this tasteless powder with food, and fed it to cats when their stomachs were empty. When they had finished their meal the stomach was filled with food which cast a dense shadow

on the X-ray film. Because the stomach is never any larger than its contents, the shadow of the opaque food showed its exact shape and contour.

Within a year after Dr. Cannon had published an account of his experiments, his method was applied on human beings and soon became one of the most important methods in diagnosing disease of the stomach; for the first time the outline of the stomach and the movements of that organ could be seen distinctly in any patient.

Thus today with the aid of X-rays every physician has become a William Beaumont, and his patient an Alexis St. Martin, with most of the advantages that his condition offered but with none of its discomforts.

CHAPTER THIRTY-FIVE

WILLIAM HARVEY



R. SAMUEL PEPYS, he of the diary and ill-used wife, had a question. He wanted to know what change would take place in an English archbishop if blood from a Quaker were transfused into his veins. That question kept recurring in his mind as he sat at the stained oak table in the low-ceilinged inn at London, in the year 1666, where a group of convivial gentlemen in the knee-breeches and periwigs of the time, had gathered to hear Dr. Croone tell of the amazing experiment he had seen performed at Gresham College.

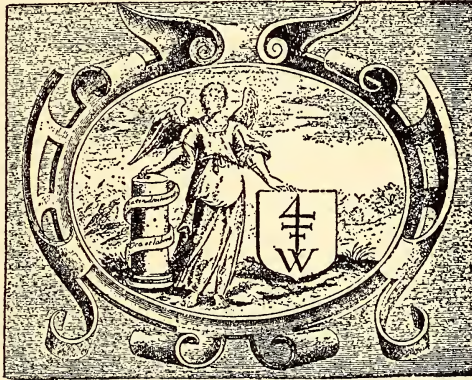
It had so happened that Dr. William Harvey a few years before had made the momentous demonstration that the blood in the body circulates through the veins and arteries, and on the basis of that knowledge Dr. Richard Lower had taken the blood from the arteries of one animal and run it into the veins of another, so making a blood transfusion. While Mr. Pepys listened to the description of the experiment, his imagination soared away in speculation on what could happen to the character and temperament of the recipient of the blood—would his disposition and his ideas change to those of the man from whom the blood had come?

Of course, Mr. Pepys recognized that this new discovery might be a means of treating disease, and he recorded in his diary that it may "be of mighty use to man's health, for the mending of bad blood by borrowing from a better body." But always the question that intrigued his imagination was what change would take place in an English archbishop if he were transfused with the blood of a Quaker.

His imagination became riotous; would a dog transfused with

the blood of a sheep gradually turn into a sheep or would he retain some of his own characteristics? Would he still remain man's best friend and companion, and at the same time become a source of wool; or would his disposition change so that, even without wool, he would seem a stupid, timid animal? Those were the questions

EXERCITATIO.
ANATOMICA DE
MOTU CORDIS ET SAN-
GVINIS IN ANIMALI.
 BVS,
GVILIELMI HARVEI ANGLI,
Medici Regii, & Professoris Anatomia in Col-
legio Medicorum Londinensi.



FRANCOFFETI,
 Sumptibus **GVILIELMI FITZERI.**
 ANNO M. DC. XXVIII

TITLE PAGE OF DR. HARVEY'S "DE MOTU CORDIS"

Published in 1628. This book presents the first demonstration of the circulation of the blood, one of the most momentous events in medical history. There are several excellent English translations of this book.

that kept running through Mr. Pepys' mind, for you see those were the days when the belief was still strong that the blood had some special spiritual quality that set it apart from the flesh.

Of course we know now that blood is one of the least alive of the tissues of the body; that it has nothing to do with character or temperament; that its only peculiarity lies in the fact that it is a liquid and can therefore escape when the body is wounded. The

blood is merely a medium, a vehicle which carries oxygen and food from one part of the body to another; just an agent of transportation which occupies the same position in the human body that a street car does in the civic body.

But the idea of the metaphysical virtue of the blood was held very strongly two hundred fifty years ago. A German surgeon of that time proposed to use the newly discovered transfusion to reconcile the parties of unhappy marriage; the incompatible pair were to be reciprocally transfused so that by sharing each other's blood they might share the same traits and interests in life. Fearing the evil consequences of this principle, the French Chamber of Deputies, in 1668, in the interest of human welfare, forbade, with severest penalties, all attempts at transfusion of blood.

Some of the old ideas about the blood still persist, but for the most part merely as forms of speech. Even now we hear such absurd terms as "bad blood" and "hot-blooded" and expressions of the old belief that blood is the real and final link in inheritance, "blood relatives."

The idea of imputing spiritual qualities to the organs of the body is an ancient but fallacious practice. Even the secretions of the body have not escaped this elevation. But why is the sweat of the brow noble when exactly the same secretion from any other part of the body is ignoble? Tears and saliva are essentially the same sort of secretion, but one is shed for tender emotions and the other is spat in contempt.

The heroes of Homer's poems had their souls in their livers, the heroines of romantic literature concealed theirs in their hearts, while in the novels of today the soul has been elevated to the brain, where it shines out through the dilated pupils of soulful maidens. In popular speech the heart has retained its hold over the "tender emotions." Thus there is the broken heart, the sweetheart, and all the imagery of St. Valentine's Day. But to bring a gross material note into these poetical matters, the conventional heart-shape as depicted on valentines and playing-cards, and carved by lovers about entwined initials on tree trunks, must have been originated by a butcher, for it is the form of a heart almost split in two and spread open. The unmutilated heart is without a notch at the top and is



MICHAEL SERVETUS

Servetus lived a century earlier than Harvey; he came close to the discovery of the circulation of the blood, for he records in his book, the *Christianismi Restitutio*, 1533, that the blood after being mixed with air in the lungs passes into the heart. Only two complete copies of this book are known to exist, one at Vienna and one at Paris; there is an incomplete volume at Edinburgh. The rest were burned with him by order of Calvin. Servetus was a Spanish physician of great ability, but, unfortunately for him, his interests led him into religious as well as physiological speculation. He sent the manuscript of his theological works to Calvin at Geneva. Although his writings show a passionate devotion to the person and teachings of Christ, his denial of the tripersonality of the Godhead and the eternity of the Son made his system abhorrent to Catholics and Protestants alike. Calvin failed to return the manuscript, and Servetus had it published secretly. The name of the author was supplied by Calvin. Servetus was arrested, but escaped from prison, made his way to Geneva, was recognized, and again arrested. He was burned alive, although there was no provision in the law current at Geneva to provide the capital punishment.

about the shape and size of a clenched fist. In spite of its spiritual elevation and the imputation of tender qualities, the heart quite automatically pumps blood—and does nothing more.

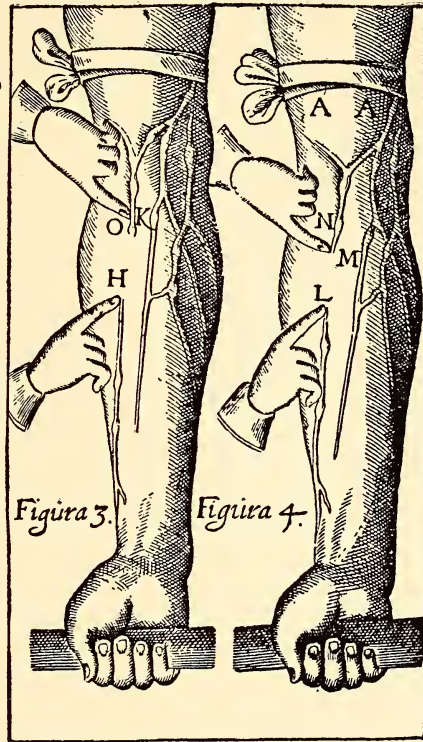
Very unromantic facts these, now that we know the blood is merely a vehicle of transportation in the body and the heart the engine which moves it—unromantic, yes, but very useful. The knowledge derived from these facts and from the demonstration of the circulation of the blood had an effect on the study of medicine quite comparable to that which the discovery of the true shape of the earth had upon civilization. The demonstration of the circulation of the blood opened up the way for the study of the diseases of the heart and disturbances of the circulation. It laid the foundation for the engineering study of the human body.

The man who first demonstrated the circulation of the blood was an English physician, William Harvey. He lived during the reigns of Elizabeth, James I, and Charles I. He was personal physician to the last monarch and accompanied him on his unhappy wanderings. But Dr. Harvey was no lowly attendant; he was a small man somewhat quick of temper when crossed in an argument, given, we are told, to fingering suggestively the handle of the dagger he wore at his belt.

He took his court duties seriously, but they did not disturb his real interests in life. There is a tale told that at the battle of Edgehill he was given charge of the princes, and with them he retired to the outskirts of the fight, where he sat under a hedge, alternately reading a book and watching over his royal charges. His greatest interest in life was experimentation in physiology, and from his experiments came the demonstration that the blood driven by the heart circulates through the veins and arteries.

Dr. Harvey was a contemporary of Shakespeare. In fact, in the same year that "Hamlet" was first produced, Harvey graduated from the medical school of the University of Padua and the same week that Shakespeare died he gave in his lecture at the College of Physicians the first description of blood circulation. But it was not until twelve years later, 1628, that he finally published his great book, *De Motu Cordis*.

The year 1628 seems a long time ago, but in the light of historical sequences it was in very recent times. The *Mayflower* had landed at Plymouth eight years before that date; and eight years after it Harvard College was opened. The men who taught the first classes in Harvard could have known Shakespeare personally; the students



A FIGURE FROM "DE MOTU CORDIS"

An illustration used by Dr. Harvey showing his experiment to demonstrate the valves in the veins of the arm.

would have found Shakespeare's plays nearer to their times than are Mark Twain's works to our own; and the professor of physiology—if there had been one at Harvard then—could have told his students how he saw Dr. Harvey demonstrate the course of the circulation. But I do not believe that in the New World college at that date they were reading Shakespeare or studying Harvey's

work; they were more interested in Latin, Greek, and Hebrew, and the sayings of the ancient philosophers.

It was the beliefs of these very philosophers that had shaped the ideas of the functions of the heart and blood up to the time of



A DISCIPLE OF DR. SANGRADO

The physician is preparing to bleed his patient. He is wrapping a band about her arm in order to obstruct the return of the blood in the veins; when he has completed this step he will open one of the distended vessels and allow a quantity of blood to escape into a basin. Treatment of disease by the withdrawal of blood is a very ancient practice and, no doubt, under proper conditions, benefit is derived. The excesses to which the practice was carried, particularly in the medicine of the seventeenth and eighteenth centuries, resulted in a reaction against it, so that it has now fallen nearly into disuse.

The character in *Gil Blas*, Dr. Sangrado, "the tall, withered, wan executioner of the sisters three," has become symbolic of the pitiless kind of blood-letting current at the time. His procedure of drawing eighteen good porringers of blood in two days can be paralleled in actual fact from the practice of physicians of the eighteenth century. Guy Patin of Paris bled himself seven times for a head cold, and his son twenty times in the course of a few days. In Italy costly bleeding glasses of Venetian glass were handed down in families as heirlooms.

William Harvey. For fourteen hundred years and more, men had been in the grasp of these ancient beliefs. When the great empire of Rome was destroyed, European civilization fell into those days

of intellectual sterility which we call the Dark Ages. Ancient beliefs even in medicine and physiology were accepted as gospel truths.

It is very difficult for us today, with our freedom in expressing our ideas, in seeking new ones and in doubting old traditions, to realize what a strong hold traditional beliefs once had on the minds of men. Why, if four hundred years ago you had dared to come forward and attempt to shatter accepted beliefs with the idea that the heart was a pump, the blood vessels its pipes, and the blood merely a vehicle of transportation, you would have been guilty of the worst kind of heresy, for which you would have been burned at the stake. You will recall that Galileo had to go down on his bended knees and beg forgiveness for daring to say what every schoolboy today knows for the truth, that the earth revolves.

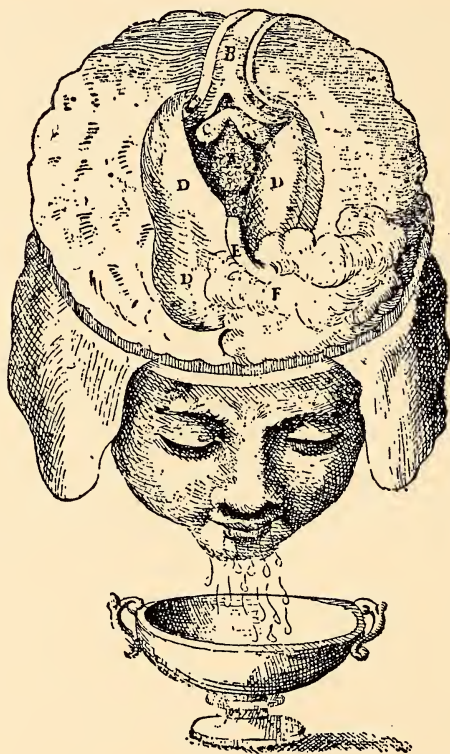
Even Dr. Harvey in the seventeenth century, although in no fear of being burned, was nevertheless at first very cautious about expressing his views on the circulation. When finally he did, many of his patients deserted him because they thought he was crazy, and the teachers and preachers stormed at him for daring to doubt old and accepted views.

Now let us examine these views which had satisfied most physicians for some thousands of years. The ancient philosophers and physicians had recognized that the heart was an organ very necessary to life. They recognized also that there were two kinds of blood-vessels branching and extending to all parts of the body—one, which we call arteries, holding blood of a bright vermilion color; another, which we call veins, with blood of a deep purple color.

But they thought that the liver was the center of the blood system. Food, they believed, was brought there and elaborated into something which they called "natural spirits." From the liver the blood flowed outward, but not in the sense we use the word flow now. Rather it slowly ebbed and returned, like a tide, carrying the "natural spirits" to every part of the body. In the brain these spirits were changed into "animal spirits" and in that form ran out along the nerves, emptying from their tips back into the veins.

The arteries that they could feel at the temple and wrists pulsated every time the heart beat, but they believed that when the heart

expanded, all the blood-vessels expanded with it. The heart, they knew, was made up of muscular bulbs, one side for the arteries and one side for the veins, but they thought that they were merely mixing-chambers, churns, to stir up the blood and mix it with a myste-



PURGING THE BRAINS

From the surgical works of an Italian surgeon, seventeenth century. It was formerly believed that the nasal secretion was formed in the brain, the pituitary gland, and found an exit through the nasal passage, as shown here. Sneezing powders were given to "purge the brains."

rious something called "vital spirits." The heart also warmed the blood; all the heat of the body was supposed to be generated there. The lungs were fans which cooled the blood.

These philosophical ideas, held so tenaciously through the centuries, were not a very substantial basis upon which to study or treat

diseases of the heart. And this whole structure so elaborately wrought in theory collapsed before the experiments of William Harvey.

The first thing that he discovered was that whereas the ancients had thought the heart expanded when they felt it beat against the ribs, it was in reality contracting; pushing blood out of it. And so Dr. Harvey asked himself this question: Does the blood thus squeezed into the arteries run back into the heart when it relaxes? A very simple experiment showed him that it did not. He tied a band about the forearm of a man; when he squeezed it just tight enough to shut off the veins, the arteries kept bringing blood along the arm until the veins below the band were distended and the arm swollen. The veins above the band were collapsed. Obviously, the blood flowed away from the heart through the arteries and eventually reached the veins. But where did the blood go to? There was only a limited amount in the body, and if it kept leaving the heart and going into the veins, it would all be gone in a short time and there would be no more to pump into the arteries. "Then," said Dr. Harvey, "I began to think whether there might not be a motion, as it were, in a circle." And that circle, the circulation, he succeeded in demonstrating.

The blood is pumped by the left side of the heart into the arteries. From the arteries, which branch into every part of the body, it permeates through the tissues and passes into the veins. In so passing, its color changes from vermilion to deep purple, as we know now, because oxygen is taken from it. In the veins the blood makes its way sluggishly toward the heart, to be sent through the lungs. But there is not enough pressure to carry it through the fine vessels of the lungs, and that is where the right side, or right bulb, of the heart comes into play. Like the left side it is a pump with valves, and it forces the dark blood through the lungs and into the left bulb to be sent out again into the arteries in the continual round of the circulation. We know now that in its passage through the lungs the blood takes up oxygen in chemical combination and turns from purple to red.

How much simpler and more practical was Dr. Harvey's conception, based on experimental truth, than the speculative system which

it finally superseded. The heart was not the seat of the soul, nor a mixing-chamber, nor yet a furnace to heat the body. The heat, we know now, comes mainly from the muscles of the body and is carried away and distributed by the blood just as the water in the circulating system of your automobile carries heat away from the engine and brings it to the radiator. In the body the skin is the radiator.

From Dr. Harvey's work any man with a knowledge of elementary mechanics could understand how the heart pumped blood and how the valves of the heart, like those in a pump, directed the flow in the proper direction. One belief, however, Dr. Harvey's work did not alter; the heart is still recognized as a very necessary organ of the body, upon whose integrity and normal action health and life depend. The tissues of the body cannot work properly or even live unless the heart sends out a full and uninterrupted flow of blood, bringing food and oxygen and carrying away waste material. Health and life depend upon a sound heart.

Dr. Harvey's work began the engineering study of the body. Now I don't mean at all that he tried to say what life is, but he did show that the body is a machine. It is different from all others because it is endowed with the mysterious something called life, but nevertheless, the actions of its parts follow the same rules that apply to non-living machines. Like them the human machine can become deranged or damaged and it can wear out. The engineer, by examining and inspecting a machine, can discover its defects and derangements before serious damage has occurred; he can also judge its strength and efficiency. The physician of today has become an engineer of the human machine. He can inspect the heart with the same certainty of detecting its derangements that an engineer has when he inspects a non-living machine. Delicate instruments are used for this purpose, measuring the pressure and flow of blood and detecting derangements in the action of the valves. Pictures are taken of the heart with X-rays, and its size and movement studied.

Now there follows a certain correlation between the inspection of living and non-living machines. Both, as I have said, are subject to derangements and disturbances which can usually be controlled or remedied if they are detected early. Every one of us has become machine-minded in this century, particularly with the ad-

TRACTATUS
DE
CORDE,
ITEM

De Motu & Colore Sanguinis, &
Chyli in eum Transitu.

*Cui accessit dissertatio de origine Catarrhì, in qua
ostenditur illum non provenire à cerebro.*

Authore

RICHARDO LOWER, M.D.

Editio tertia, & ultima.

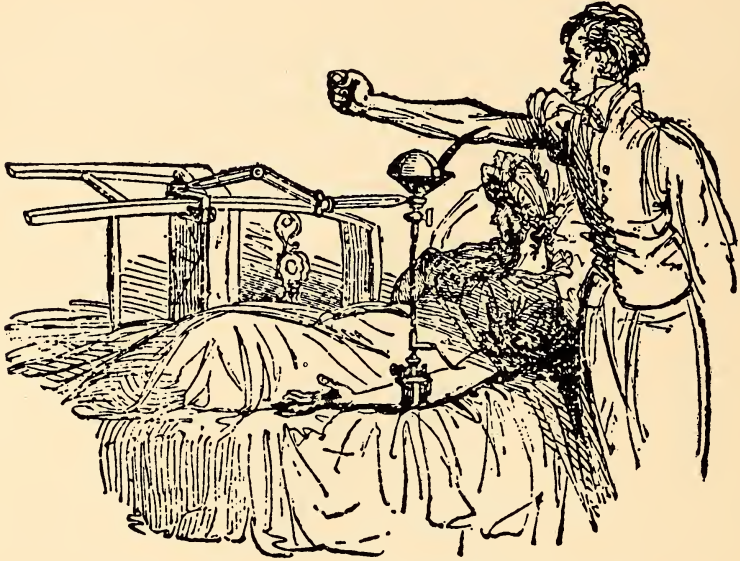


AMSTELODAMI.
Apud DANIELEM ELSEVIRIUM.
M. DC, LXXI

DR. LOWER LOCATES THE SOURCE OF CATARRH

Richard Lower, an English physician of the seventeenth century, was the first to perform direct transfusion of blood from one animal to another (February, 1665). In his book on the circulation, of which the frontispiece is shown here, he demonstrated that the source of the catarrhal secretion is in the mucous membrane of the air passages. Conrad Schneider, of Germany, had made the same discovery some years previous, but unknown to Dr. Lower.

vent of the automobile. And all of us, I am sure, realize the importance of regular inspection of machinery. With the automobile, neglect of this measure is quickly brought home in terms of simple economics. With the body, the neglect of inspection may result in drastic consequences, but unfortunately they are not in terms of



AN EARLY METHOD OF TRANSFUSING BLOOD

Although blood transfusion was performed as early as the seventeenth century, it was not until the twentieth century that the operation became thoroughly practicable. The American surgeons were largely responsible for introducing this life-saving measure for the treatment of wounded during the World War. In the crude method shown here, attempted with indifferent success in the early nineteenth century, the blood from the donor ran into a funnel and was pumped from there into a vein of the patient. The difficulties encountered in the procedure arose from the clotting of the blood.

simple economics; they are in terms of health and life. You can purchase a new automobile but not a new life. The human body is an intricate machine which needs regular inspection. Your physician calls this inspection a physical examination or an annual health audit. It is time we became machine-minded about our bodies.

CHAPTER THIRTY-SIX

THE MENACE OF MIDDLE AGE



THE ancient Roman law, like our own of today, divided life into two main periods, minority and majority. In spite of this legal limitation to only two parts, the larger dictionaries admit the term middle age and define it with charming ambiguity as the middle portion of life. A few years ago scientists announced to the world on very excellent evidence that the tissues of the body were potentially immortal; properly protected and nurtured, the flesh would go on living to the end of time.

I want to discuss the menace of middle age, but it would appear that the term needs some preliminary defining. First let me ask you a question. What is your definition of middle age? Now I am sure that your answer will be colored by your own age. Seen through the eyes of a fifteen-year-old, twenty-five is middle age, thirty-five senescence, and forty-five senility; but through the eyes of an octogenarian, fifty is still childhood.

Treating age as a matter of years brings us into all sorts of difficulties in defining age. In most of the states of our country twenty-one is taken as the age at which maturity begins, but seventeen of them differ in giving eighteen as the figure for the maturity of girls; three of them break away from chronology and specify that a girl attains majority on marriage, irrespective of age; and one state similarly favors the male sex. A legal and a religious ceremony, rather than years, may thus establish one of the periods of life.

Suppose in our search for a definition of middle age we turn to the so-called span of life. There is an average and apparently a maximum figure for the duration of living things. It is enormously variable in different forms of life. The insect called the day fly springs

into maturity, passes into senility, and dies of old age, all in the course of a few hours. Rats protected from their natural enemies live some thirty-five to forty weeks, chickens carry on for three to five years, geese to fifty, and parrots to eighty. Horses are decrepit at thirty, but among the fish, carp and pike go on to a hundred and fifty or two hundred years, although only under artificial conditions do they escape their enemies for this length of time.

The baobab tree of Cape Verde is supposed to endure for five thousand years, and the sequoia of California almost as long. The tiny one-celled animals called paramacia, if cared for, apparently live forever, continually rejuvenating themselves, for as age and size creep upon them, they split into pairs of youthful twins and start life all over again.

The Biblical span of human life is given as threescore years and ten; that would bring the middle point of life at thirty-five. Some men have lived to a hundred, but really only a very small portion of the total population reaches even the Biblical span. The actual average span of life as found from statistics is fifty-eight, rather than seventy, and so the middle of life, or middle age, would be at twenty-nine. In 1854 the expectancy of life was only forty years. On this average basis middle age fell at twenty, a year before maturity. Four hundred years ago the expectancy was only twenty years, so that mere children of ten had attained the middle of average age.

I don't believe that actual years have much to do with age, and I don't believe at all in this hypothetical thing called middle age. It exists merely in the mind as a menace, a turning-point at which life starts on the down grade. You know as well as I that some men and women of fifty act younger and appear younger than many of thirty. Appearance and action are matters of health, not years.

There is a disease, a very rare one indeed, called progeria, or anticipated senility, in which a baby, normal to all appearances, commences about the age of two to develop a careworn expression. By nine its hair is falling out, and its skin wrinkling; at twelve it looks like a miniature old man or woman; it usually dies of senility before becoming mature in the legal sense of the word.

Physiologists in defining the periods of life carefully ignore the term middle age. We furthermore work on the assumption that very

few people die of the state called old age. In fact I sometimes wonder if anyone dies just from the fullness of his years. Physiologists carry the first main period of life up to a point called maturity, which they define as the time when the body has reached full growth of bone and muscle; it is physically mature, but not necessarily at its fullest mental vigor. With some hesitancy they place eighteen to twenty-five years as covering the period required to attain the beginning of this physical maturity. And maturity, they say, is the period of life in which men and women exercise their full physical and mental powers.

Beyond the attainment of maturity physiologists have nothing more to say of actual years. They do not even mention such a thing as middle age. Maturity they terminate at the beginning of old age, and they put no time to old age; it may be thirty or it may be seventy. They say merely that old age is a period characterized by various chronic disorders gradually encroaching on the normal functions of the body.

One is forced to agree with the Latin philosophers, Terence and Cicero, that old age is a disease. Youth is health. As long as you retain your health you retain your youth. The menace of middle age is merely the menace of beginning old age—failing health, failing vigor, failing zest of life. There has always been much talk about and much desire for prolongation of life, but it is not the miserly desire to add a few more years to life already made miserable by failing health. It is rather a desire to push back old age by prolonging maturity. And we can only prolong maturity by holding off the chronic disorders that gradually encroach upon the normal functions of the body.

Now there are two ways to live a long time in health. The first way is beyond our control; it has been summed up in the advice to choose your ancestors carefully. Longevity, it implies, is in part a matter of inheritance, of inborn vitality. And that inborn vitality is your own particular resistance to the encroachment of chronic disorders. The other way, and unfortunately the only one over which we have any control at all, lies in continual vigilance directed toward the detection of encroaching disease, detection in those early stages when its advances may be arrested.

I say nothing at all here about how you should live or how I should live to conserve that inherited endowment of vitality which each one of us receives, but receives in such differing amounts. Rules of moderation there are; you know them. But how can you tell what your inborn inheritance is? Some men and women break and age when confronted by strains and abuses that leave others apparently unaffected. Too often fads and fancies based on false



AGUE AND FEVER

From a drawing by Rowlandson. The patient is in the clammy grasp of the chill serpent. The demon of fever is waiting with arms extended to embrace the sufferer as soon as the chill has passed.

premises or bad logic influence the rules for sane living. There is no road to health through either fad or simple ritual that compensates for neglect and self-indulgence.

The rugged old gentleman of ninety whose vigor we envy has his philosophy of long life. Perhaps he attributes his health and vigor to the fact that he never worried about his health but always ate and drank what he wanted and did what he wanted to do. Of course he did. By the mere chance of ancestors he was endowed with a glorious inheritance of longevity. Why should he worry? Even

his bad habits couldn't altogether overcome the vigor he was born with. His health is good, but his philosophy is bad.

Few of us inherit the potentiality for extreme age, and that is why most of us must be on our guard to detect and arrest the first encroachment of disease if we are going to hold off an early old age.

I have always been deeply impressed with the great number of physical disabilities disclosed by the examination of the men drafted for the World War. Our draft did not go into the higher age groups. It was eighteen to thirty-one; one-third of the men drafted were rejected from active service. The English experience was more striking than our own. In their draft of men between the ages of eighteen and forty-two, sixty-four per cent were rejected from full active service. And in the draft at Liverpool eighty-five per cent in ages thirty-five to forty were rejected and ninety-three per cent in ages forty to fifty. The encroachment of chronic disorders is certainly indicated in those rising figures for rejections from active military service, thirty per cent between eighteen and thirty-one years and ninety-three per cent between forty and fifty years.

In time of national crisis, such as war, we now recognize the indispensability of medical examination in sorting the physically young from the physically old. Years alone are not a criterion of age. Men of eighteen may be rejected and some of fifty accepted; nor is obvious infirmity a sufficient basis for the differentiation. A man may feel healthy, look healthy, and act healthy, and yet on careful examination there may be found those beginning changes in heart or lungs or liver or kidneys which, if unarrested, soon become chronic diseases leading to premature old age. These diseases and not actual years are the menace of middle age, the turning-point in life, the start on the down grade. If detected early, these diseases can usually be arrested; but if they are undetected and hence allowed to progress, they are as irreparable as age itself.

I said earlier that the cells of the body and the tissues which they form are potentially immortal. Minute bits of them taken from the body, placed in an incubator, kept entirely free from bacteria, protected from injury, carefully nurtured with tissue juice, apparently will go on growing and dividing indefinitely; they live and grow

and function long after the man from whom they are taken is in his grave. Mortality is not an inherent property of the tissues of the body; they are potentially immortal, perpetually young. Why then do men age and die? They do so because the tissues of their bodies do not have the protection and nurturing that it is possible to effect artificially for a minute scrap in a test tube; that scrap would die quickly if it were deprived of nourishment or if it were contaminated with bacteria.

The body ages and fails because its tissues are part of a very complicated system based on coöperation. Sooner or later some factor affects this coöperation; some tissue, usually a vital one, such as that of the heart or liver or kidneys, is unable to stand up against the abuse and the strain to which it is put, or to resist the infection or poisoning to which it is exposed. The tissue so affected does not necessarily die, but it does cease to function properly. Its failure affects the coöperation among all the tissues of the body; they are deprived of nourishment by a weakened heart, clogged with waste products by damaged kidneys, or poisoned by a diseased liver. All the tissues suffer, age, and fail with the one that has given way first.

The modern health audit—modern because this great health measure has been in use only a few years—is designed to detect the first weakening of a vital tissue, the first indication of the failing coöperation that leads to age. It is today the greatest measure in the whole field of medicine for prolonging youth and forestalling the encroachment of old age.

Here are two facts that seem to me very striking indeed. In an examination of one thousand presumably healthy clerical workers, three-quarters of whom were between the ages of thirty and fifty-five, 781, or seventy-eight per cent, were shown to possess physical impairments of significance. From our knowledge of the army drafts, that was to be expected; but the important fact is that 728 of these men were totally unaware of their impairments prior to the examination. That is, the impairments were brought to light by the health audit before they had progressed to the stage where they would interfere seriously with health.

Now there would be no point in this detection of impairments if the matter were to stop there; it might even be better for peace of

mind to refrain from the detection. But here is the second fact shown by statistics obtained from the records of a great insurance company. Its policy-holders were offered periodic physical examinations. Some accepted, and some did not. The number of deaths among men and women between the ages of fifty and sixty, those examined and those unexamined, were tabulated over a period of six years. The figures showed that for every one hundred deaths among the unexamined there were only forty-seven deaths among those examined, a reduction of fifty-three per cent in mortality.

In the face of such figures as these it would seem that indifference to the enormous benefits of the annual health audit would give way and be replaced by the keenest enthusiasm. But the health audit is very new in the practice of medicine; its benefits are not yet fully appreciated. The objection has been raised that the questioning of supposedly well people about their health would have an unsettling and disturbing effect upon their minds.

The situation involved here is the same as that in the dental prophylactic examination, only the dental examination has already become well established. We don't caution people against having their teeth inspected because of the fear that their minds will be disturbed if the dentist finds a cavity. Rather, we urge them to begin early in life to seek this inspection frequently, in order to detect decay and other disorders in their early and, therefore, repairable stages.

Fear is curable, but the aging that comes from neglected chronic disease is not. And, in addition, there is this feature: nothing tends to quiet the mind so much as facing facts. Truth takes away a worry exaggerated by uncertainty. Of course no one likes to be told that his blood pressure is rising, that his arteries are hardening, or that his kidneys are beginning to fail in their function. But, unfortunately, denying facts does not alter them. It is only by facing them frankly that we can control them.

CHAPTER THIRTY-SEVEN

THE PENALTIES OF IGNORANCE



HISTORY, as most of us were taught it in school, presented a pathway of dates upon which there trod a procession of kings and emperors, generals and admirals, in all their glory or ignominy, as the case might be. To many of us these great men of the past seem different from ordinary human beings; history pictures them that way. But nevertheless, in one respect they were like all of us; they had sickness and infirmities even as we of today—and they all died. These physical ailments they had influenced their activities, biased their minds, altered their judgment, and perverted their justice. Physical ailments do these things to every man, but for most of us our inefficiencies affect only our own successes and the happiness of our own families. But there is this difference in the case of the kings and emperors; they held in their hands the destinies of many people, and so the effects of their infirmities are written largely in history as the success or failure, happiness or unhappiness, of whole nations.

Not only does history usually fail to tell us how kings and emperors lived, but it also fails to tell us how they died. And yet the manner of their deaths must have reflected the conditions of their times. Unless rulers died in unusual and spectacular ways no comments are made about their ends—they died what are called natural deaths. Every schoolboy can tell you how Julius Cæsar was assassinated, how Charles I was beheaded, and how Louis XVI and Marie Antoinette mounted the guillotine. These were not natural deaths and hence they attract and hold attention. But our schoolboy friends are silent on the question of how Louis XIII, XIV, and XV

came to their ends. They died, but there was nothing spectacular about the way they did it.

This particular attitude taken towards the lives and deaths of great men is one that is entirely characteristic of our own views today on the lives and deaths of those about us. These views are reflected in our newspapers. The front pages of them are covered with reports of deaths by unusual and spectacular means. This sort of thing seems to hold an interest for most people. Just refer to your paper and notice the space given over to deaths by shooting, stabbing, falling, and from wrecks, earthquakes, and other unusual modes of demise. The people involved in these accidents are not by any means important and well-known people. The interest is not in the victims, but in the accidents. After you have read of these affairs with all the gruesome titillation that they seem to give to the average newspaper reader, turn over the pages until you come to those obscure columns of finely typed obituary notices. For every one spectacular death featured on the front page there are hidden away, in these notices in the back, twenty-five or more deaths from natural causes.

The choice of that phrase, "natural causes," is most unfortunate. Sickness is not natural, and most of the deaths reported are distinctly unnatural. What the term is taken to mean is usual or common—in fact, so common as to attract no attention. One of the peculiarities of the human mind is that everything that is common is accepted as normal. As long as a thing is common, it is accepted as inevitable and therefore considered natural.

Now I don't mean to imply that if enough interest were aroused we could do away entirely with the obituary notices. It isn't so much that people die, as it is that they fail to live long enough. They die before their bodies are worn out. What it all amounts to is that they fail to live well enough. The final and fatal disease is rarely alone responsible for their deaths, but is usually merely the culminating symptom of a mass of minor physical inefficiencies and illnesses. All of these symptoms—even the final one—are accepted as natural, and consequently they will continue to exist as long as they are looked upon in that light, in spite of the fact that in reality most of them are preventable.

It is an obvious fact that most men and women are fundamentally

indifferent to their own health and to the health of their children. Their tardy interest is aroused, and they are shaken out of their indifference only when disease is actually present. To carry this situation over to a similar one in the field of law would mean that men and women would continue to be ignorant of the laws, and conduct themselves without regard to the laws until they found themselves in jail. Ignorance of the law is no excuse, and so they would continue in jail. Neither is ignorance of the laws of health an excuse for sickness. Whether in law or medicine the penalties of ignorance are equally certain and equally drastic.

In recent years great progress has been made in eliminating sickness and prolonging life. But these advances would be infinitely greater if the opportunities offered were accepted to their full extent. As it is, most of the saving of life and most of the elimination of sickness have occurred without the active participation of the individual man or woman. They have been brought about by general measures of sanitation and preventive medicine which affect everyone without his realizing it. I mean such measures as sewage disposal, water purification, quarantine, and food inspection. The time, however, has come when further advancement can be made only with the aid of each individual working to eliminate the so-called *natural* causes of sickness.

The paradox in the situation regarding these natural causes is that every now and then one of them passes into the class of unnatural causes. But this change is slow and can be appreciated only in contrast afforded by long periods of time. If a man sickened and died of Asiatic cholera in New York or San Francisco today, that would constitute an unnatural cause of death, for that disease should not occur in this country. The papers would herald the event as an important and startling item of news. And yet Asiatic cholera was one of the natural causes of death in New York eighty years ago, and it followed the forty-niners in the gold rush and was carried to the west coast.

In order to make an even greater contrast I want to tell a little something from the life—medical life—of four historically famous personages. They are King James I, William and Mary of England, and Louis XIV of France. These people were all very important in

their time. Each of them had the very best care that money or influence could procure for them.

Let us start with James. He came to the throne of England in the year 1603. He was an inefficient king, boastful, arrogant, cowardly, and childish. There were reasons why he might well be all



INTERIOR OF A FIFTEENTH-CENTURY PHARMACY

The containers toward which the pharmacist is pointing bear, as was the custom then, symbolic and heraldic labels to designate their contents.

of these things. In the first place, as a child he was unable to walk until he was six years old; his body was deformed, and all the rest of his life he walked with an awkward gait, usually leaning on the arm of one of his favorites. The cause of his deformity, as given at the time, was that he had been poisoned by the milk of a drunken wet-nurse. The truth of the matter is that James had rickets. That was a natural disease then, but it should be an unnatural one now,

for it is entirely preventable, and furthermore it is curable if detected in its early stages. Every mother who is interested in her baby should know that her physician can, if she will turn to him, prescribe the amount of light, and the kind of diet, necessary to prevent rickets, and that if it has already occurred he can, by X-rays, detect the disease in its early stages. But James had none of these advantages, and so he stumbled his awkward way through his court.

If one may judge from pictures of his face and descriptions of his actions, he probably had enlarged tonsils and almost certainly an enlarged adenoid. There were no operations then to remove obstructions to breathing, and so his nose and upper jaw were deformed, and he held his mouth open. He had nasal catarrh, and since he had no handkerchief he did the best he could with the lace on the cuff of his coat. A most unkingly picture, but adenoids were natural then, and handkerchiefs were not.

James' teeth decayed, and probably this was hastened by the deformity of his jaw. But there was no orthodontic treatment then to straighten out his teeth, nor dentistry to prevent decay or to repair its ravages. When his teeth had decayed down to the level of the gums he bolted his food. Quite naturally, he had indigestion. Having discovered that his colic became particularly severe whenever he was worried by matters of state, he thenceforth refused to allow matters of state to worry him.

He had rheumatism—probably an after effect of his infected teeth—and his joints became so stiff that he had to be lifted onto his horse, from which he frequently fell. He developed gout and then malaria. There were then no curative treatments for malaria; for cinchona, or quinine, was not discovered until some time later. So King James died a natural death.

Now let us skip over a brief section of British history and come down to the reign of that efficient king and charming queen, William III and Mary. Under their rule England moved along toward unity and prosperity. Then, at the age of thirty-three the queen died a natural death—that is, natural for those times. Let me read a few lines from Macaulay. He says: "Toward the end of the year 1694, smallpox was more than usually severe. At length the infec-

tion spread to the palace and reached the young and blooming queen. She received the intimation of her danger with true greatness of soul." By which Macaulay means she was as philosophical about the matter as we are today about our so-called natural diseases. Macaulay continues: "She gave orders that every lady of her bedchamber, every maid of honor, nay every menial servant who had not had the smallpox should instantly leave Kensington House." And I may add that the house was still well staffed, for smallpox was as common then as measles is today, and more so. Most of her staff were marked with the disease, but most of her ladies and maids of honor were not, and that is one reason why they were chosen for the position. The absence of smallpox marks made them conspicuously beautiful in those days of almost universal disfigurement.

Her husband, William, stayed by her side until the end, for he had had the disease some years before. William, however, had other illnesses. He had tuberculosis and only survived the queen by eight years, to the great loss of England. In his time, tuberculosis was the commonest of all natural causes of death. Today, that same disease is slowly becoming one of the unnatural causes. There are only one-fifth as many cases from it now as there were seventy years ago. Nevertheless, it is still a tremendously injurious and wasteful disease, but an entirely preventable one. Our present decrease has come largely from general measures of sanitation directed toward the abolition of the insanitary and unhygienic living conditions under which the disease thrives. Today the worst slum is more sanitary than the palace in which William and Mary lived.

The further elimination of tuberculosis depends now upon the coöperation of the individual in the use of the tuberculin test and the physical examination with X-ray inspection in time of health—in short, personal preventive medicine.

Let us consider just one more king, and he is Louis XIV, the Grand Monarch. He was the healthiest ruler in Europe in his day, and under his guidance France rose to that position of elegance to which her capital still lays claim. In spite of his unusual health and vigor, Louis had a few of the diseases natural to his time. By

present-day standards, even with these few diseases he would be judged as distinctly a pathological specimen.

He started out at birth with two teeth, so we are told, and much to the worryment of his wet-nurse. He had smallpox when he was nine, and a few years later a venereal infection. He had typhoid fever before he was twenty, and when he was twenty-five he contracted measles from the queen. He had a tapeworm. His teeth decayed and became abscessed—he had pyorrhea, and no tooth-brush. At forty-four he developed gout, and in the following year he dislocated his elbow in a fall from his horse. Three years later he developed a most personal, but unmentionable complaint, that interfered considerably with his royal magnificence, and for a time he did not sit upon the throne. He was cured by surgical treatment. Incidentally the surgery of his time was in ill-repute, and the royal recourse to this art served to rehabilitate it. Next the king acquired malaria from the mosquitoes which rose in swarms over his favorite carp pond. The king took quinine, newly introduced from South America. He was cured, and his recovery popularized the use of quinine. Later he had a serious carbuncle, his gout grew worse, and he developed hardening of the arteries. The king soon thereafter died of these natural causes.

Louis was interested in all matters of medicine, and he availed himself of every opportunity they offered, but these opportunities in his day were very few. Medicine was crude and primitive; there was no science about it at all. He endeavored to improve it. He rehabilitated surgery in France, he popularized quinine, and, what is more, he even went outside the field of his own personal health, and for the first time in thirteen centuries of European history called in a physician to take charge of an obstetrical case, his child by La Vallière. Prior to that time all births had been left entirely in the hands of old women, and so Louis in a measure was the founder of modern obstetrics.

I don't want to say that if Louis had had the advantages of modern medical methods he would have lived any longer than he did, but certainly he would have lived better. More than three-quarters of the afflictions he suffered from are now entirely preventable. Louis, with his keen interest in medical matters, was one of those

unusual individuals who utilize all of the means available to keep themselves well. His misfortune lay in the inefficiency of the means.

Today efficient means for prevention of disease are available to every man. Yet the preventable diseases still exist. They are still called "natural." For this condition there are two reasons; they are ignorance and indifference.

CHAPTER THIRTY-EIGHT

MEDICAL INNOVATIONS



LEGEND has it that in the year 1483, at Winington, Shropshire County, England, there was born an infant boy who was christened Thomas Parr. He grew up to be a farmer. There is nothing noteworthy about his life until 1613, one hundred thirty years later. It was recorded in this year that he threshed grain. He was beginning to attract attention locally, for a man who can thresh grain with a hand flail at the age of one hundred thirty is something of a curiosity! His fame, however, did not grow to national proportion until 1635, when he was brought to the attention of Thomas Howard, Earl of Arundel, who took him up to London so that the king might see him.

This was an unfortunate journey for old Parr; except for it he might still be threshing in the peaceful fields of Shropshire. The rich food of the city so disagreed with him that he died of indigestion soon after reaching London in the hundred-fifty-second year of his life, so we are told. Some writers on the subject have gone so far as to call his death an accidental one, for when his body was examined by Dr. William Harvey at the request of King Charles, every organ was found to be in an excellent condition. This Dr. Harvey is the famous physician who first described the course in which the blood circulates.

Old Parr was buried in the south transept of Westminster Abbey, where this inscription over his grave may still be read:

THO: PARR OF YE COUNTY OF SALOPP BORN IN AO 1483.
HE LIVED IN YE REIGNES OF TEN PRINCES VIZ. K. EDW. 4,
K. ED. V. K. RICH. 3. K. HEN. 7. K. HEN. 8. K. EDW. 6.

Q.MA. Q. ELIZ. K. JA. AND K. CHARLES, AGED 152 YEARES
AND WAS BURIED HERE NOV. 15. 1635.

Unfortunately, in justice to full truth, it must be admitted that modern historical research, after turning its cold scrutiny toward this matter of old Parr's hundred and fifty-two years, has an-



The Old, Old, very Old Man, or Thomas Parr, the Son of John Parr of Winnington, in the Parish of Alberbury, in the County of Shropshire; who was borne in the Raigne of King Edward the Fourth, being aged 152. Yeares and odd Montbes, and now lies buried at Westminster.

OLD PARR AT THE AGE OF 152 YEARS AND SOME MONTHS

From John Taylor's *The Old, Old, Very Old Man*, 1635.

nounced that his age is grossly exaggerated. He was very old, no one denies that, but certainly he was not a hundred and fifty-two. There may have been two Thomas Parrs, father and son, or uncle and nephew, whose overlapping lives have become confused. Parr was old; Harvey, who did the autopsy, said he was very old. So even if he didn't live the full hundred and fifty-two years it nevertheless remains true that people of four hundred years ago were

capable of living a long time. But the fact remains they rarely did so, for when we turn from old Parr to the ten kings and queens in whose reigns he lived, we find quite a contrast in length of life. Three of the kings—that is, thirty per cent—died violent deaths of a kind peculiar to the occupation of kingship in those days. Edward V. was murdered at the age of thirteen; Richard III was killed in battle at the age of thirty-three; and Charles was beheaded at forty-nine. Edward VI, who came to the throne at the age of ten, died at sixteen, probably of tuberculosis. The remaining six kings began their reigns in their mature years; their ages averaged twenty-seven at the time of coronation. They died of various ailments at the average age of fifty-three.

If, now, by way of comparison, you were to look up a modern insurance table giving the expectancy of life for men and women in good health who have reached the age of twenty-seven, you would find that they should, on the average, live to about sixty-three or sixty-four. If we can take these ten kings and queens as fair representatives of their time (and they were probably unhealthy rather than otherwise), the figures would indicate that we have in four hundred years added not more than ten years to the expectancy of life of people who have reached the age of twenty-seven. Evidence from all other sources leads to the same conclusions.

Now, on the other hand, consider another group of figures quite different in their meaning from those we have discussed. These are for the average length of life of all people today, starting, not with maturity, but with the time of birth. That average figure is somewhere between fifty-five and fifty-eight. A hundred years ago it was thirty-five. Four hundred years ago it was only about twenty. Thus since the time of old Parr the average length of life has been nearly tripled.

What these figures signify is this: four hundred years ago, and even a hundred years ago, a great many young people died, but those who survived their youth lived nearly as long as adults do today. Our increase in average length of life from a span of only twenty to one of fifty-five or fifty-eight has resulted largely from saving babies from death and from eliminating diseases that attack

young people—the infectious diseases. Our present average is due not to the fact that adults live longer, but to the fact that fewer children die.

Our present-day infant mortality, viewed in the light of the possibilities of saving infant life which modern medicine offers, is disgracefully high; but a hundred years ago it was beyond all present-day conception. One of the great causes lay in the fact that artificial feeding of babies had not been successfully developed. With proper care a baby today suffers no serious hardship in being raised on a bottle, and most babies are partially fed that way. But a hundred years ago bottle-feeding was almost equivalent to a death warrant for the baby. Even under the very best conditions sixty or seventy per cent died. In the foundling homes, where the unchecked spread of infectious diseases was added to the inefficiencies of the bottle-feeding of those days, the results were almost beyond belief. To cite a rather atrocious example, here are the figures from the Dublin Foundling Asylum for the years 1775 to 1796. In that period 10,272 babies were admitted. Forty-five survived. The mortality was 99.6 per cent.

But even those children of bygone days who survived infancy were by no means free from dangers. Diphtheria confronted them, and there was then no known method of prevention or cure; until almost a hundred years ago the deadly smallpox was as common as measles; typhoid fever was a thousand times more prevalent than it is today. If the child survived in spite of these diseases, there was always waiting for it the one which John Bunyan called "The Captain of the Men of Death"—consumption. That disease, which is now preventable, once led all others as a cause of death. Less than a hundred years ago the deaths from tuberculosis were five times as frequent as today. In those bygone days there was only one way of preserving the human race against the inroad of the diseases that carried off the young: that was to have families of prodigious size. As we see it now, it was a tragic and pitiful situation, a frightful but unpreventable waste of human life.

The force responsible for increasing our average length of life is general preventive medicine, largely a development of the last century. Its starting-point was the discovery that bacteria are the

cause of infectious diseases. On the basis of this knowledge means were developed for controlling the spread of the disease bacteria. The measures of public health and sanitation, such as sewage dis-

The Old, Old, Very Old Man

OR,

The Age and long Life of *Thomas Parr*, the
Son of *John Parr* of *Winnington* in the Parish
of *Alberbury*; in the County of *Salop*, (or *Shropshire*)
who was borne in the the Raigne of King *Edward*
the fourth, in the yeare 1483.

Hee lived '152 yeares, nine monthes and odd dayes,
and departed this Life at *Westminster* the 15 of *Novem.*
1635, and is now buried in the Abby at *Westminster*.

His Manner of Life and Conversation in so long
a Pilgrimage; his Marriages, and his bringing up to
London, about the end of *September* last. 1635.

Whereunto is Added a Postscript, shewing
the many remarkable Accidents that
happned in the Life of this *Old Man*.

Written by JOHN TAYLOR.

LONDON,

Printed for *Henry Goffon*, at his Shop on
London-Bridge, neere to the Gate.

1635.

Re-printed for J. STURGE, No. 40, High-Street, St. Giles's,
By J. Barker, 19, Great Russell-Street, Covent-Garden.

THE STORY OF A MAN WHO LIVED IN THE REIGN OF TEN PRINCES

Title page of John Taylor's *Life of Thomas Parr*.

Modern studies show that in reality Parr was probably less than a hundred years old at the time of his death.

posals and water purification, were introduced and became an integral part of our way of living; they are built into our laws. As a result of these general measures from which everyone shares the

benefit, most of the serious infectious diseases have been brought under control.

Infectious diseases strike primarily at children. The bodies of young people are fresh and vigorous; their organs do not break down or wear out with neglect and abuse until adult years. Children rarely have such diseases as hardening of the arteries or cancer, nor do they have chronic kidney disease such as affects men and women of middle age. As a result of the control of infectious diseases most of our children now reach maturity. But unfortunately general preventive medicine does not give assurance that they will live to the ripe old age that adults can and should attain.

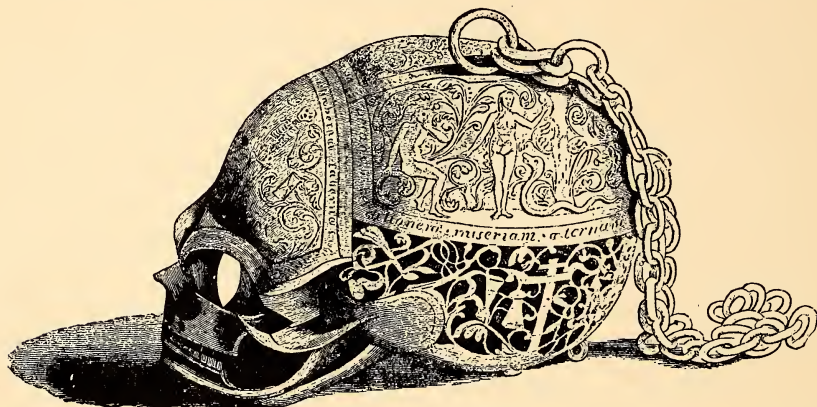
We have been successful in getting our children raised, but that is only one phase of our problem. How long are they going to live as adults? That is the question that is beginning to confront medical science of today and will confront the medical science of tomorrow even more.

The situation that confronts us is this: as we have diminished the occurrence of one disease, another has risen to take its place. A few years ago tuberculosis led in the causes of death; today it has fallen to fifth place. In its stead are diseases of the heart and blood-vessels and only second below them is a newcomer among the leaders of mortality. This new arrival that has forged ahead is cancer.

Now there is a perfectly obvious reason for this change in the causes of death. The great increase of cancer today is due mainly to the fact that more people live long enough to have a disease which rarely comes before thirty. Cancer is increasing largely because the boy and girl who a hundred years ago would have died of diphtheria or smallpox now live long enough to develop cancer. They also live long enough to have diseases of the heart and blood-vessels, which are likewise more prevalent after thirty.

The measures of general preventive medicine which have successfully contended with infectious diseases and so have raised our average length of life are useless in controlling the diseases of middle age—those which now head our list of mortality. No amount of sanitation, such as quarantine and water purification, will affect them. They can be controlled only by personal preventive medicine which involves the active participation of each individual.

Diseases of the heart and blood-vessels develop slowly, so that they can usually be detected in their incipency. When so detected, their progress can be arrested. Take as a concrete example the very common hardening of the arteries which gives rise to no pain or other warnings of its presence but which is one of the causes of cerebral hemorrhage, commonly known as stroke or apoplexy. Once this hardening has occurred, the arteries cannot be restored to their original strength and elasticity. But usually the hardening process is preceded for months or years by an increase in blood pressure or



A MEMENTO MORI BELONGING TO MARY QUEEN OF SCOTS

A silver *memento mori* consisting of a watch shaped like a death's-head and said to have been presented by Mary Seaton.

by definite alterations in the urinary secretions. These preliminary changes give warning of the impending arteriosclerosis. Although this hardening of the arteries cannot be remedied, it can be delayed and many years thus added to life. But before this desirable step can be effected, there is one prerequisite. The warning must be seen and heeded. It can only be detected by frequent, complete, and searching physical examinations. Such examinations are the basis of personal preventive medicine.

Like the changes in the blood-vessels, cancer usually develops slowly. And, as I said in the chapter devoted to cancer, if detected in its early stages, it is curable by surgical operation, radium, and X-ray. *But its first indication must be seen and heeded.* The cause

of the present high mortality from cancer comes mainly from the fact that the individual does not know what these warnings are, or else they are ignored. A periodic physical examination, if it is complete, will give the opportunity for detecting cancer and, what is equally important, it will establish a relationship with a physician who will gladly supply all of the necessary information concerning the early symptoms of cancer.

The idea of the periodic physical examination—the health audit—is of recent origin. The health audit that I am talking about is not the perfunctory sort of looking over that many of us are accustomed to consider as a physical examination. A health audit is a serious and thorough investigation of the body, a minute search for those changes which are preliminary to disease.

One would think that the paramount importance of the annual health examination would be at once apparent to everyone who wished to prolong his life to the full and healthy extent that is now possible. Nevertheless, the idea is frequently treated with indifference. Frankly, some of this indifference is on the part of the medical profession. Many physicians now practicing have been trained to treat disease rather than to maintain health. They lack interest in the presumably healthy man; they become solicitous only when he has developed one of the complaints that should and could have been prevented.

In this connection let me quote from an address given a few years ago by Dr. George E. Vincent of the Rockefeller Foundation. He was speaking to a group of physicians, discussing the present and the future of medicine. He said:

The change of emphasis from cure to prevention has caught the doctor napping. The average physician is ill-prepared to make the periodic health examination and to give the advice about personal hygiene which the new régime demands; he has been trained to look for disease rather than health. . . . [If we are to achieve prevention we must] permeate the medical school with the preventive idea and modernize the medical profession as a whole.

Already there are signs that the medical profession is moving in the direction indicated by Dr. Vincent. In the summer of 1931 the American College of Surgeons held its meeting in New York City. The newspapers reporting the scientific sessions bore, on

October 15th, the headlines, "Surgeons Ask Periodic Health Examination to Extend Life Span."

The blame for previous and even present indifference towards personal preventive medicine was put upon the public rather than upon medical education; the papers bore this pronouncement: "The American public is criminally reckless in regard to the conservation of its greatest treasure, its individual and public health. Maintaining health is far simpler than regaining it."

The final statement on the subject of the newer medicine by the august body of surgeons was, "Of the measures by which good health can be achieved, the most important is the periodic health examination."

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